

PAN-AMERICAN ADVANCED STUDIES INSTITUTE ON TRANSPORTATION SCIENCES (PASI-TS)

(TOLUCA AND QUERÉTARO, MÉXICO, AUGUST 27TH-SEPTEMBER 4TH, 2005)

FINAL REPORT

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Abstract

The Pan-American Advanced Studies Institute on Transportation Sciences was held July 24-August 7, 2005 in Toluca and Querétaro, Mexico. This report gives an overview of the recruiting process, participants breakdown by countries and institutions, the organization and structure of the technical sessions and networking activities, as well as a summary of the outcomes and feedback from the participants.

I. Introduction

The Pan-American Advanced Studies Institute on Transportation Sciences (PASI-TS) was held July 24-August 7, 2005 in Toluca and Querétaro, Mexico. The main objective of the PASI-TS was to provide the foundation for enhanced cooperation among transportation researchers in the America and to foster the development of a new generation of transport scientists with a hemispheric and global view of transportation issues and their solutions that, ultimately, may bring about new paradigms of transportation science and practices through their research activities.

The need for the PASI-TS is derived from the confluence of different factors. Among them, several must be highlighted:

A) The role of the transportation as potential source of significant energy conservation and environmental gains, and an enabler of economic development

Without a doubt, the transportation sector throughout the world has important implications in terms of economic development, energy consumption, and environmental impacts. For illustration purposes, it is important to highlight that the transportation sector in the U.S. accounts for 11% of Gross Domestic Product, and one out of every nine U.S. workers is employed in transportation and related industries (OTT, 2001). These statistics provide indication of the significance of the transportation sector to the national economies.

In terms of energy consumption, transportation accounts for more than a quarter (i.e., 28%) of total national energy use in the U.S. in 2001, which is equivalent to 13 million barrels of oil per day (DOE, 2003). Worldwide, the transportation sector's share of world oil consumption is 40% (of which 17% belongs to the U.S. transportation sector). The International Energy Outlook 2003 (EIA, 2003) projects that over a 24-year forecast horizon, from 2001 to 2025, the transportation energy use will significantly grow. Despite the increases in the penetration of new technologies such as hydrogen-fueled vehicles, petroleum products are projected to remain the primary energy source in the transportation sector (EIA, 2003). From the environmental standpoint, these trends raise serious concerns as vehicular emissions are a major source of air pollution.

Given the detrimental environmental impacts, the growing traffic congestion costs, and the economic impact of motor vehicle crashes, which was estimated to cost \$231 billion in year 2000 (NHTSA, 2002), transportation professionals are now faced with the enormous challenge of developing effective strategies to address these externalities produced by transportation activities. Such strategies could range a wide variety of options such as

transportation demand management, efficient utilization of existing capacity, better planning, and better resource management. For the mitigation policies or measures to be effective in the transport market structure, the likely behavior of both private and public stakeholders, and the complex operations of transportation systems need to be thoroughly understood. In this regard, advancement of transportation research and science plays a significant role because better transportation modeling methodologies translate into a better understanding of the dynamics of transportation phenomena; and enables the design and implementation of transportation projects that produce significant energy savings, and positive environmental and economic development impacts.

B) The existence of strong transport research programs in Latin America that, for the most part, have been pursuing world class independent research tracks with relatively little cooperation and interaction with U.S. researchers

This project put together researchers from leading U.S. and Latin American universities. U.S. participation came from the Rensselaer Polytechnic Institute, the University of Puerto Rico, and other universities. The Rensselaer Polytechnic Institute (RPI) —one of the premier schools in transport research—was the lead institution.

In Latin America there are a number of truly outstanding research programs. The most established ones take place in Brazil, Chile and Mexico. Leading academicians representing all these countries participate in PASI-TS. These programs are characterized by their emphasis on basic and applied research aimed at ultimately maximizing the benefits attributable to transport projects, while minimizing their detrimental effects (e.g., pollution, accidents). As a consequence, research in Latin America places a strong emphasis on transport planning, transport economics and transport operations.

In Brazil, there are about 15 universities with graduate transportation programs, with over 100 faculty members and hundreds of graduate students. These research centers are housed in a number of Transportation, Civil and Industrial Engineering Departments, and in Urban Planning and Development programs, covering diverse issues related to transportation. The leading research universities are the University of São Paulo, with programs housed at Escola Politécnica and at the São Carlos Engineering School, and the Federal University of Rio de Janeiro/COPPE graduate program in transportation engineering. Brazilian researchers showcase their research by both participating in international conferences and by attending the annual research meeting sponsored by ANPET – the Brazilian Association for Research and Education in Transport. This important organization, similar to the U.S.’ Transportation Research Board, is in charge of advancing transportation research and education by means of organizing the annual meeting and technical courses.



The leading transportation research centers in Chile are the Department of Transport Engineering at the Pontificia Universidad Católica de Chile (PUC), and the Department of Civil Engineering at the Universidad de Chile. There are also some

other universities that have some Transport researchers and offer Transport courses to their students. Altogether they have approximately 40 faculty members (including associate research staff) that advise 30 graduate students per year. Chilean academics showcase their research activities by publishing extensively in the leading journals in the field and by presenting papers at the most important conferences in the area throughout the world. The PASI-TS benefited from the participation of Professors **Rodrigo Garrido** and **Juan de Dios Ortúzar** from the PUC, and Professors **Sergio Jara-Díaz** and **Francisco Martínez** from the Universidad de Chile. These two groups have made important contributions to Chile's transport sector through several applied research projects for the different government agencies associated to transport as well as national and international institutions. They also house important laboratories, such as the Traffic Engineering Lab at PUC and the Land Use and Transport Lab at Universidad de Chile. Finally, transportation research is also conducted at the Universidad de Concepción, the Universidad Católica de Valparaíso, and teaching at technical level is undertaken at the latter and at the Universidad Tecnológica Metropolitana.

Transportation research in Mexico is promoted both at the Federal and University levels. The main instrument for fostering transportation research at the Federal level is the Instituto Mexicano del Transporte (IMT), or Mexican Institute for Transportation. Traditionally, the IMT has focused on intercity transportation research, while universities and research institutes focus on various facets of urban transportation. The Federal government through the IMT also sponsors human resources training in transportation. Currently, 70% out of the IMT's 200 employees are working on several research projects. The PASI-TS benefited from the participation of Dr. **Jorge Acha-Daza**, whom as the leader of the Unit of New Technologies at the IMT, is in charge of conducting research in the area of Intelligent Transportation Systems. Dr. Acha-Daza is also a member of the Mexican ITS-Committee. He is working on the development of the Mexican ITS architecture. Professor **Oscar Sánchez** at Universidad Autónoma del Estado de México (UAEM) played an important role as the liaison between the PASI-TS and the Mexican university scientists conducting transportation research. These universities have approximately 70 faculty members in transportation (including research staff) and graduate close to 40 Master and PhD students every year.

C) The limited opportunities for formal interaction between Latin American and U.S. researchers and the potential synergies to be achieved from active collaboration

In spite of the considerable research output and international stature of the academic institutions and researchers mentioned in this proposal, there is relatively little cooperation among them. This is due to the combined effects of physical separation and time availability constraints. As a result, a negligible amount of interchange of ideas takes place between U.S. and Latin American researchers. In this context, providing a formal medium of cooperation among these transportation programs that—for the most part, have grown independent of each other—is expected to translate into a significant interchange of ideas and, ultimately, into the development of synergistic relationships among participating partners.

D) Anticipated benefits from the PASI-TS

- i. U.S. students would benefit from having direct contact with the premier Latin American researchers;

- ii. Latin American students would also benefit from direct exposure to preeminent U.S. researchers, and to current research projects;
- iii. Students from both the U.S. and Latin America would have the opportunity to create an international network of like-minded individuals, who share similar personal goals and professional objectives;
- iv. Participation in the PASI-TS would provide students with a hemispheric perspective of transportation research, instead of a country-centric point of view;
- v. Bringing together the various strands of transportation research taking place in both Latin America and the U.S., would undoubtedly translate into a significant amount of interchange of ideas and would open the doors for new research opportunities;
- vi. The multidisciplinary nature of the participants (including faculty from the Schools of Engineering, Management and Economics) would lead to cross-fertilization among the participating disciplines;
- vii. Multi-lateral research projects could be put together in the future because of the identification of complementary needs and interests among PASI-TS participants;
- viii. Researchers from both the U.S. and Latin America would have a formal opportunity to get to know each other, ongoing research projects, and to develop formal linkages of cooperation. This would ultimately translate into the development of long term sustainable cooperation programs among Latin American and U.S. researchers.

II. Overview of the PASI-TS

The PASI-TS was jointly sponsored by National Science Foundation (NSF) and the United States Department of Energy with additional support provided by Rensselaer Polytechnic Institute (RPI), Universidad Autónoma del Estado de México (UAEM) and Instituto Mexicano del Transporte (IMT). PASI-TS was planned and organized by Professor José Holguín-Veras, with Michael Silas and Noel Perez at RPI as assistant coordinators. The local organization was the responsibility of Professor Oscar Sánchez from UAEM, and Doctor Jorge Acha-Daza from IMT. Meanwhile, PASI-TS Advisory Committee provided suggestions and comments during the process. The detailed information of the organizers and the advisory committee is shown in Appendix 1. The Organizing Committee was comprised of representatives from each of the participating countries. The members of the committee are:

- United States: José Holguín-Veras (RPI), George List (North Carolina State University), and Didier Valdes (UPRM)
- Brazil: Nicolau Gualda (Escola Politecnica da Universidade de Sao Paulo), Antonio Novaes (Universidade Federale de Santa Catarina), and Orlando Strambi (Escola Politecnica da Universidade de Sao Paulo)
- Chile: Juan de Dios Ortúzar (PUC), Rodrigo Garrido (PUC), Sergio Jara-Diaz (Universidad de Chile), and Francisco Martinez (Universidad de Chile)
- Ecuador: David Briggs (Grupo DBA)
- México: Oscar Sánchez (UAEM), and Jorge Acha-Daza (IMT)

These individuals had been selected because of both their scientific stature and their prominent participation in research organizations which will enable all of them to leverage their relations for the success of PASI-TS.

The topics covered in the technical sessions included transportation planning, transportation economics, transportation policy, traffic engineering and control. PASI-TS took place at two different cities in **México, Toluca from July 24 to July 30** and **Querétaro from July 31 to August 6**. The two hotels are equipped with state of the art meeting rooms that provided a suitable location for lectures and meetings related to the PASI-TS.

2.1 Recruiting

The recruiting process focused on two groups of participants: junior faculty members and advanced PhD students in transportation science or related fields. For the student participants, preferences were given to doctoral students whose research interest or dissertation topics are closely related to PASI-TS topics. To apply for the PASI-TS, every participant had to submit the following materials: (1) one completed PASI-TS application form available on the PASI-TS web page; (2) one letter of recommendation from their faculty advisors; (3) 400 word essay (single spaced) describing research and career objectives; (4) (optional) 400 word research abstract for presentation during the PASI-TS. Participants were recruited by two major ways, the PASI-TS website and the distributions of information by emails to the universities and research institutes in the United States, Canada and Latin-American countries.

The PASI-TS website was used as a platform of distributing the information and recruiting. The website contains information about the PASI-TS and the application forms. The email database from the XIII Pan-American Conference of Traffic and Transportation (PANAM) in 2004 was used to broadcast information about PASI-TS. This database contains more than 5,000 email addresses of transportation professionals and researchers. The organizers and the advisory committee members also played significant roles in distributing information about PASI-TS.

Over 70 applications were received from eight countries and areas. The selection process was done in collaboration with the organizing committee members. The selection criteria included research interest, research experience, recommendation letters, and the ability to deliver advanced presentation or lectures. The top 50 applicants were selected for participation in the PASI-TS. In accordance with NSF guidelines, 50% of participants were from the United States.

2.2 Minicourses, Lectures and Presentations

Knowledge was shared by three different venues: minicourses, lectures, and presentations. Minicourses were reserved for senior faculty, who were given typically an hour and a half to provide a comprehensive treatment of the topic of their research. Lectures were assigned to junior faculty who had one hour to lecture on their research topics. Doctoral students gave presentations of their ongoing research. In all cases, active questions and answer sessions followed. Senior faculty gave feedback to both junior faculty and doctoral students. The general schedule is shown in Table 1. For the detailed schedule, the readers are referred to Appendix 2.

Table 1. The General Schedule of PASI-TS 2005 (Weeks 1 and 2)

Week 1	Monday, July 25	Tuesday, July 26	Wednesday, July 27	Thursday, July 28	Friday, July 29
8:00	Breakfast & Registration	Breakfast	Breakfast	Breakfast	Breakfast
9:00	Opening / Welcome	Technical Sessions			
10:00					
11:00					
12:00	Technical Sessions				
1:00	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
2:00	Technical Sessions	Strategic Partners Initiative	Technical Sessions	Technical Sessions	Foundation for Pan-American Cooperation
3:00					
4:00	Transportation Policy Workshop I		Transportation Policy Workshop II		Breakout Sessions
5:00					
Week 2	Monday, August 1	Tuesday, August 2	Wednesday, August 3	Thursday, August 4	Friday, August 5
8:00	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast
9:00	Technical Sessions	Technical Sessions	Technical Sessions	Technical Sessions	
10:00			Transportation Policy Workshop II		
11:00			Technical Sessions		
12:00					
1:00	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
2:00	Technical Sessions	Foundation for Pan-American Cooperation	Technical Sessions	Strategic Partners Initiative	Visit to IMT
3:00					
4:00		Common Research Agendas			
5:00					

2.3 Networking Activities

There were four types of networking activities: Strategic Partner Initiative, Institutional Foundations for Pan-American Cooperation, a transportation policy workshop, and technical and cultural tours.

The purpose of the Strategic Partner Initiative was to help junior faculty and students identify their common research interests, and also strengthen connections between them. Research proposals were collected from each student and junior faculty. The Institutional Foundation for Pan-American Cooperation discussion was intended to collect inputs about how to improve collaborations within the Pan-American research society. A transportation policy workshop was also scheduled. For the detailed information of these activities, the readers are referred to Sections 3.5 through 3.7 in Chapter III.

Several technical and cultural interaction tours were added to the evening schedules of the first week and the end of the second week. The aim was to provide chances of knowing the research topics and work done in Mexico and experiencing the distinct Mexican culture.

2.4 Website Preparation

In order to provide up-to-date information on the proposed PASI-TS to a wider audience, the Organizing Committee developed a website (<http://www.rpi.edu/dept/eng/live/PASI/Website/index.htm>). The website was used to disseminate the results of the meetings and the reports produced. It was also used to provide details on the lectures and topics and the recruitment procedures. Meanwhile, the website

included links to other web pages and documents related to the themes of the PASI-TS. After the PASI-TS, this website will be maintained as a platform of communicating and distributing information between participants and other fellows.

III. Structure of the PASI-TS

3.1 Participants Breakdown

In total, there were 48 participants, including 13 (27.1%) senior faculty members, 15 (31.3%) junior faculty members, and 20 (41.7%) advanced PhD students. Participants were from eight countries, and the detailed breakdown by countries is shown in the figure below. It is also important to mention that these participants were from 32 different institutions. Among them, four institutions had at least three participants: RPI (4 participants), North Carolina State University (3), University of South Florida (3), and Universidad de Chile (3). Six institutions had two participants: Morgan State University, University of California at Davis, University of Maryland, University of Washington, Pontificia Universidad Católica de Chile, and Escola Politecnica da Universidade de Sao Paulo (Brazil). The remaining twenty-two institutions had one participant: Clemson University, Mississippi State University, University at Buffalo, University of Alabama, University of Arizona, University of Texas at Austin, University of California at Berkley, University of Illinois at Urbana-Champaign, University of Puerto Rico at Mayaguez, University of South Carolina, Centro de Investigacion en Matematicas (Mexico), ITESM-Toluca, IMT, Universidad Nacional Autonoma de Mexico, Universidade Federal do Rio Grande do Sul (Brazil), Universidade Federale de Santa Catarina (Brazil), University of Waterloo (Canada), University of British Columbia (Canada), Instituto Tecnológico de Santo Domingo (Dominican Republic), Universidad Andres Bello (Chile), Universidad del Norte (Colombia), and University of Sydney (Australia). A detailed list of participants is shown in Table 2. Also, there were some local participants, including fifteen from Toluca and nine from Querétaro.

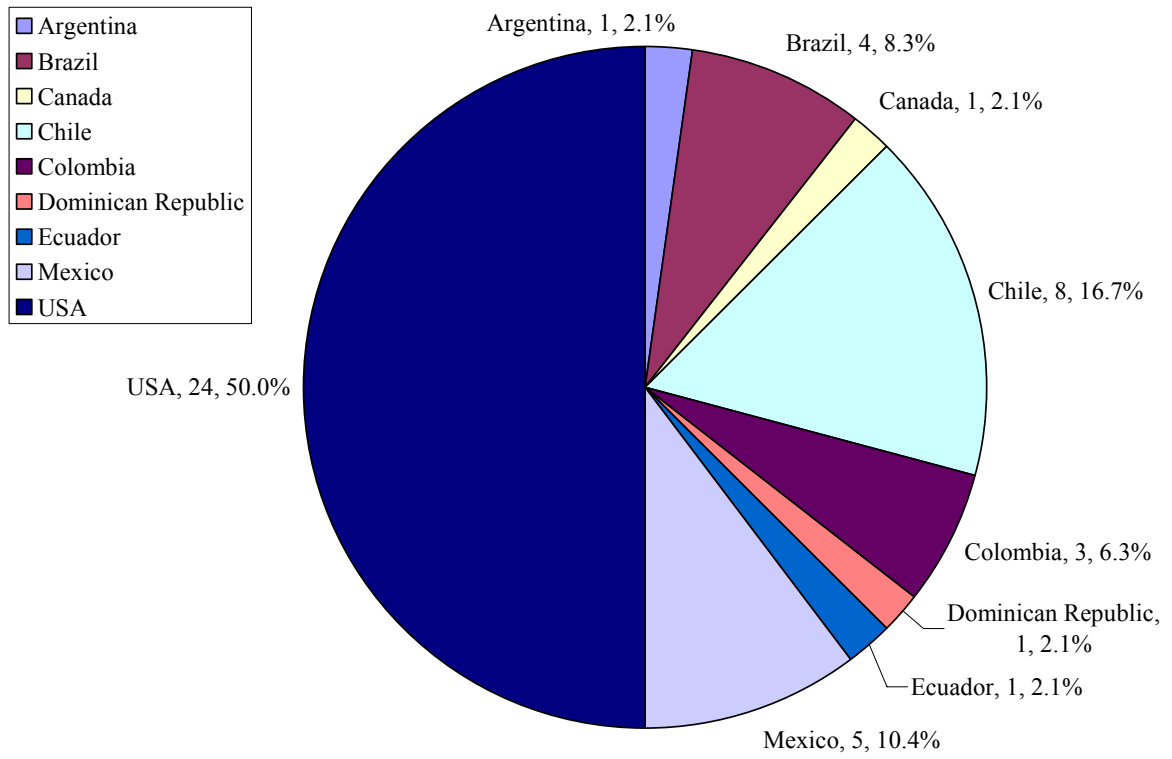


Figure 1. Breakdown of the PASI-TS Participants

Table 2. List of Participants

Country	First Name	Last Name	Institution	Type
Argentina	Miguel	Figliozi	University of Sydney	JF
Brazil	Mara	Diogenes	Universidade Federal do Rio Grande do Sul	PhD
Brazil	Nicolau	Gualda	Escola Politecnica da Universidade de Sao Paulo	SF
Brazil	Antonio	Novaes	Universidade Federale de Santa Catarina	SF
Brazil	Orlando	Strambi	Escola Politecnica da Universidade de Sao Paulo	SF
Canada	Brian	Lee	University of Washington	PhD
Chile	Leonardo	Basso	University of British Columbia	PhD
Chile	Rodrigo	Garrido	Pontificia Universidad Catolica de Chile	SF
Chile	Ricardo	Giesen	University of Maryland	PhD
Chile	Sergio	Jara-Diaz	Universidad de Chile	SF
Chile	Francisco	Martinez	Universidad de Chile	SF
Chile	Pablo	Miranda	Universidad Andres Bello	JF
Chile	Marcela	Munizaga	Universidad de Chile	JF
Chile	Juan De Dios	Ortuzar	Pontificia Universidad Catolica de Chile	SF
Colombia	Alejandro	Angel	University of Arizona	JF
Colombia	Victor	Cantillo	Universidad del Norte	JF
Colombia	Isabel	Victoria	University of Texas at Austin	PhD
Dominican Republic	Alexandra	Cedeno	Instituto Tecnológico de Santo Domingo	PhD
Ecuador	David	Briggs	Grupo DBA	SF
Mexico	Jorge	Acha-Daza	Mexicano del Transporte	SF
Mexico	Jose Ramon	Dominguez	Centro de Investigacion en Matematicas	PhD
Mexico	Luis	Miranda	University of Waterloo	PhD
Mexico	Maria	Munoz	Universidad Nacional Autonoma de Mexico	PhD
Mexico	Oscar	Sanchez	ITESM-Toluca	SF
USA	Steven	Jones	University of Alabama	JF
USA	Jarice	Rodriguez	University of Illinois at Urbana-Champaign	PhD
USA	Jawad	Abdullah	Morgan State University	PhD
USA	Irene	Casas	University at Buffalo	JF
USA	Grisselle	Centeno	University of South Florida	JF
USA	Mecit	Cetin	University of South Carolina	JF
USA	Elaine	Chang	University of South Florida	JF
USA	Kelly	Clifton	University of Maryland	JF
USA	Gustavo	Collantes	University of California at Davis	PhD
USA	Isidro	Delgado	University of South Florida	PhD
USA	Alixandra	Demers	North Carolina State University	PhD
USA	Anne	Dunning	Clemson University	JF
USA	Joel	Franklin	University of Washington	PhD
USA	Jose	Holguin-Veras	Rensselaer Polytechnic Institute	SF
USA	Manoj	Jha	Morgan State University	JF
USA	George	List	North Carolina State University	SF
USA	Carolyn	McAndrews	University of California at Berkley	PhD
USA	Noel	Perez	Rensselaer Polytechnic Institute	PhD
USA	Deborah	Salon	University of California at Davis	PhD
USA	Michael	Silas	Rensselaer Polytechnic Institute	PhD
USA	Ellen	Thorson	Rensselaer Polytechnic Institute	PhD
USA	Didier	Valdes	University of Puerto Rico at Mayaguez	SF
USA	Billy	Williams	North Carolina State University	JF
USA	Li	Zhang	Mississippi State University	JF

Note: JF=Junior Faculty; SF=Senior Faculty.

3.2 Senior Faculty Minicourses

Senior faculty gave minicourses during the two-week PASI-TS. Eleven major topics were covered provide an overview of the current transportation research in the Americas. These topics include: (1) supply chain management, (2) traffic operation and control, (3) urban transportation network, (4) urban goods modeling, (5) logistics, (6) public transportation service, (7) traffic flow theory, (8) hazardous wastes management, (9) urban planning modeling, and (10) discrete choice theory. The detailed descriptions of these topics are in Appendix 3.

3.3 Junior Faculty Lectures

Selected junior faculty gave lectures on their research on different topics, including: (1) transportation infrastructure, (2) traffic operation, (3) traffic flow prediction, (4) simulation, (5) transportation planning, (6) rural transportation and air quality, (7) modeling time assigned to activities, (8) discrete choice modeling, (9) distribution network design, and (10) pricing. The abstracts of the lectures are shown in Appendix 4.

3.4 PhD Students Presentations

Selected doctoral students gave presentations on their research or dissertations on various topics, including: (1) integrative freight market simulation, (2) value pricing, (3) discrete choice modeling, (4) transportation safety, (5) urban transit, (6) advanced traveler information system, (7) transportation policy, (8) infrastructure maintenance, (9) hazardous materials transportation, (10) inventory routing problems, and (11) economic analysis of airport pricing and privatization. The abstracts of the presentations are included in Appendix 5.

3.5 Strategic Partners Initiative (SPI)

SPI entailed breakout discussions in which the participants in the different focus areas defined a common research agenda for the immediate and long term future. These research agendas took the form of a statement of research goals and objectives, accompanied by corresponding problem statements, and likely funding sources. This enabled the participants to tackle joint research projects as part of an overarching long term plan of research.

In terms of scheduling, the SPI discussions spanned over two weeks. The participants spent the first three days attending the PASI-TS and interviewing senior and junior faculty about emerging trends in transportation science. Before the group discussions, senior faculty shared their experience of how to write successful proposals. Initially, the participants were split into eight groups based on their interested research areas at the beginning of the first week. The classified areas included: (1) transportation economic and social impact in terms of passenger flow; (2) traffic engineering and control in terms of passenger flow; (3) traffic engineering and control in terms of freight flow; (4) traffic engineering and control in terms of intermodal transportation flow; (5) transportation planning and policy in terms of passenger flow; (6) transportation planning and policy in terms of freight flow; (7) transportation planning and policy in terms of intermodal transportation flow; and (8) transportation design and infrastructure.

The groups formed met to discuss potential research ideas. Then, group discussion results were reported at the end of the first week. The proposals submitted by students and junior faculty before the PASI-TS played important roles in the initial discussions. Six proposals were created which involved the following topics: effects of CBD parking prices and parking availability on car ownership and transport mode choice; cost-benefit analysis of the international collaborations for hurricane events; synthesizing real-time probe vehicle trajectories for network condition monitoring; impact study of toll pricing strategies on the freight distribution of the urban area and others.

During the second week, group members narrowed down the focus of their proposals. They either created new groups or improve the previous topics. On the fourth day of the second week, they decided on their final research topics and present their proposals. The new topics created at the end of the second week includes: evaluation of transportation externalities in different countries by discrete choice modeling approaches. The last day was dedicated to deliberations concerning the definition of common research agendas.

3.6 Institutional Foundations for Pan-American Cooperation

The PASI-TS arranged a brainstorming discussion of the Institutional Foundations for Pan-American Cooperation. Its main objectives were to find the efficient ways to foster Pan-American cooperation and identify the role of the Pan-American Conference of Traffic and Transportation Engineering. The discussions took the entire afternoon on the second Tuesday (August 2, 2005). Free discussion and group brainstorms were both used for generating suggestions and ideas. The participants provided a lot of constructive suggestions which can be categorized into three groups: principles that should be followed; future directions for the Pan-American cooperation; and the proposed projects for the near future.

After the discussion, the participants reached the agreements on the principles that should be followed for the future Pan-American cooperation. Participants agreed that strong cooperation starts with the well-defined goals and objectives. Therefore, properly defining the objectives is the fundamental step for any cooperation activities. Secondly, funding is a very important issue that should be concerned during any cooperation. When multiple countries or research agencies are involved in Pan-American cooperation, proposers should clearly explain to sponsors who will benefit from these projects or activities, and also keep sponsors in mind the necessity and the significant role of the cooperation. Meanwhile, issues such as the sharing of research resources and the imbalance in funding opportunities should also be well-addressed. The third principle reached is that any cooperation activity should be proposed on the standpoint of raising the welfare of the world. In this context, we should learn from each other and avoid reinventing the wheel. To improve communications, understanding and mutual respects between each other should be raised initially. The restrictions preventing collaboration should also be cut. All the efforts will be put together to find opportunities of greatest gains.

Participants also suggested the future directions of the Pan-American collaborations. The most mentioned suggestions include: (1) creating a center for Pan-American cooperation; (2) using PASI-TS as a medium to create a cooperation network; (3) having PASI-TS meet regularly (Pan-American Conference as a model); (4) having a PASI-TS meeting/reception at TRB and the Pan-American Conference; (5) including more disciplines involved in transportation beyond civil engineering; and (6) creating an archive to facilitate future sponsorship. Several potential projects were identified for the near future cooperation: (1)

developing a Pan-American journal; (2) creating a virtual community by the means of a formal website and a contact list.

3.7 Transportation Policy Workshop

A planning game software, GUTS, was used as the tool for participants to experiment how the decision-making strategies and the corresponding transportation policies affect the performance of the urban transport system. Participants met twice during the first week to be taught how to operate the game. Teams were constructed based on personal preferences. Meanwhile, each team was required to include students from both English-speaking countries and Spanish-speaking countries. All the teams reported the results during the middle of the second week. Then, senior faculty compared the results to summarize the advantages and disadvantages of different policy-making strategies.

3.8 Tours and Activities

The tours and activities after daily meeting are shown as below (see Appendix 2): (1) Visit to Instituto Tecnológico de Estudios Superiores de Monterrey campus Toluca; (2) visiting the downtown of Toluca; (3) visiting the Centro Mexiquense de Cultura; (4) visiting Cosmovital; (5) Visiting Metepec; (6) Visiting Taxco; (7) Visiting the pyramids of Teotihuacan; and (8) Visiting the Instituto Mexicano del Transporte. These were afternoon activities financially supported by the local Mexican organizers.

IV. Outcomes

The two-week PASI-TS provided participants unique opportunities of interactive learning and cultural exploration. The main outcomes of the PASI-TS include:

(1) Advanced lectures and presentations. The minicourses made by senior faculty covered almost all the major research areas in transportation, such as transportation planning, economics, traffic engineering, transportation safety, infrastructure and operations. What is more, most of lectures given summarized not only the historical trace but also the dimensions of the corresponding topics to make sure the comprehensive view provided to the junior faculty and graduate students. Meanwhile, junior faculty and graduate students got chances to present the research results that they achieved. By the after-presentation discussions, they got useful feedbacks from the senior faculty and their fellows.

(2) The social network built among the transportation professionals of the Americas. This network was enhanced at six different levels: (i) among senior faculty; (ii) among junior faculty; (iii) among doctoral students; (iv) between senior faculty and junior faculty; (v) between junior faculty and doctoral students; and (vi) between senior faculty and doctoral students.

(3) Students and junior faculty from each of the seven areas identified their common research topics. The seven proposals provided by them were highly-praised by senior faculty. The active interactions and the common research agendas are likely to support the development of common research projects.

(4) Enhanced cultural interactions will benefit future communication.

(5) Suggestions provided for the future collaboration within the Pan-American society.

V. Program Evaluation: Participants’ Feedback, Lecturers’ Feedback

Project team members designed two evaluation forms for lecturers (senior and junior faculty) and participants separately. Most PASI-TS participants filled out and submitted the evaluation forms to the staff by the end of the PASI-TS. The evaluation forms were composed of several statements and let the attendants to rate on a five-point scale: (1) Strongly Agree; (2) Agree; (3) Neutral; (4) Disagree; and (5) Strongly Disagree. They could also provide comments after each statement, indicating what they like/dislike of the event and suggestions for improvement. Table 3 shows a list of questions included in the evaluation forms for both lecturers and participants.

Table 3. Evaluation Questions

Lecturers	Participants
1. The structure of the PASI (lectures, discussions, meals and tours) was conducive to information exchange and research collaborations.	1. The structure of the PASI (lectures, discussions, meals and tours) was conducive to information exchange and research collaborations.
2. The PASI allowed me to have valuable cultural interactions with students and colleagues	2. The PASI allowed me to have valuable cultural interactions with lecturers and my peers.
3. The technical content at the PASI will help my research.	3. The technical contents at the PASI will help my research.
4. I had enough time for my presentation and after discussion.	4. The PASI was a useful international networking experience.
5. The PASI was a useful international networking experience.	5. The PASI gave me valuable experience in international team building.
6. This event was effective in promoting networking and research collaborations among young Pan-American scientists.	6. I plan to continue the research collaborations that I started at this PASI.
7. The students were well selected for this event.	7. The lecturers were well selected for this event.
8. What was your impression of student participation?	8. What did you appreciate most about this event?
9. What did you appreciate most about this event?	9. What did you like least?
10. What did you like least?	10. What are your suggestions for improvement?
11. What are your suggestions for improvement?	

In general, the project team obtained 10 completed evaluation forms from lecturers and 22 from participants. Overall, lecturers and participants agreed that the PASI-TS was a extremely positive experience. Table 4 presents the average scores for several items from lecturers. Table 5 presents the average scores for several items from participants.

For the first statement, comments included: “a bit more structure for the first collaboration meeting would have been helpful”; “workshops and working teams were very useful”; “next time we should ask people to bring ideas for real proposals they need to submit to their own institutions”; and “social and academic activities conducted to information exchange and integration among researchers”.

For the second item, lecturers comment that the cultural interaction with students and colleagues was the most valuable PASI-TS component; and getting to know colleagues from Latin America working in the area of transport is useful.

For the third one, mentioned that at times it was too technical especially for those that are not in engineering. Another said that: “Much of the content was out of my research area. Nonetheless, I found it stimulating, educational, and valuable”; and another said that “contents let me know some aspects related to my research”.

In terms of the time allocated to presentations, one lecturer commented: “the time for lectures was OK. Probably some of the students should get more time; another said: “In my particular case I needed more time, but I understood the existence of time constraints.”

Regarding to the statement that PASI-TS was useful international networking experience, some lecturer commented: “This was very useful. I really enjoyed the interactions are hope to make good use of them.” Another said that: “The interactions were excellent. More individuals with research areas closer to mine would have fostered more direct contacts. I did meet several researchers, however, that gave me additional contacts from their countries.”

For the sixth item, they commented that the social events and free time really fostered relationship building; and also the event is a first step. We need to continue working on the network.

Regarding to the selection of the student participants, lecturers commented that selection was a bit heavy in discrete choice/economics/planning. Personalities meshed very well. Some said that students seemed to be high-caliber, well-informed students. Also, they mentioned that many were able to interact beyond their dissertation research areas.

Table 4. Evaluation from Lecturers

Item	Average Score
1. The structure of the PASI-TS (lectures, discussions, meals and tours) was conducive to information exchange and research collaborations.	1.3
2. The PASI allowed me to have valuable cultural interactions with students and colleagues.	1.1
3. The technical content at the PASI-TS will help my research.	2.0
4. I had enough time for my presentation and after discussion.	1.6
5. The PASI was a useful international networking experience.	1.2
6. This event was effective in promoting networking and research collaborations among young Pan-American scientists.	1.2
7. The students were well selected for this event.	1.7

Note: (1) Strongly Agree; (2) Agree; (3) Neutral; (4) Disagree; (5) Strongly Disagree.

Lecturers seem to have very good impression of the student participants. They said that students seemed to be very strong in their areas of research, and in few years most participants are going to be excellent researchers. When asked about what they appreciate most about the event, most of them mentioned the interaction among group members, the networking experience, the degree of knowledge exchanged, among others. For the things that they like the least, they mentioned not clear about the proposal writing exercise and would like to have more time devoted to that.

Table 5. Evaluation from Participants

Item	Average Score
1. The structure of the PASI-TS (lectures, discussions, meals and tours) was conducive to information exchange and research collaborations.	1.5
2. The PASI allowed me to have valuable cultural interactions with lecturers and my peers.	1.3
3. The technical contents at the PASI-TS will help my research.	2.0
4. The PASI-TS was a useful international networking experience.	1.3
5. The PASI-TS gave me valuable experience in international team building.	1.8
6. I plan to continue the research collaborations that I started at this PASI-TS.	1.6
7. The lecturers were well selected for this event.	1.9

Note: (1) Strongly Agree; (2) Agree; (3) Neutral; (4) Disagree; (5) Strongly Disagree.

Regarding the structure of the PASI-TS, participants have very positive comments about it, they said the activities were well planned; they have plenty of time to interact with other people formally and informally; and the lectures were enlightening and instructive. Though they also suggested that it could be improved, such as the strategic initiative, e.g. it could be set up more as a game with clear objective and clear rules, and the research proposal exercises could have been more structured, e.g., advisors should have visited groups to check in for questions and advice, more time for final presentations was needed and guidance. Also, most of participants are satisfied with meals and tours.

Most participants commented that the networking/interaction part of PASI-TS was very important and it worked really well. They appreciate that PASI-TS provided plenty of formal and social opportunities of interacting/exchanging information with researchers from different countries and different transportation research areas.

Regarding to the technical contents of the PASI-TS, they mentioned that the land use and transportation modeling and discrete choice modeling workshops were the most useful. Some participants mentioned that the scope was really broad, and they were exposed to a lot of issues they did not know or outside their area of work, so they might not directly help their own research. However, they learned new things and it never hurts to keep tabs on those areas.

Most participants strongly agree that the PASI-TS was a useful international networking experience and it is very successful in this aspect. They said that the mixing of US and Latin American researchers worked well, it allowed valuable interaction and networking experience. In terms of experience in international team building, most participants agree that it was valuable.

Regarding to continuing the research collaborations that they started at this PASI-TS, some participants said that they will start as soon as possible, some said that they plan to start or they will seek opportunities, others said that they will keep in contact with peers.

For lecturers selected at this PASI-TS, most participants agreed that they were well-selected. They said that they were from a number of different countries working in a number of different areas who, for the most part, were able to present their work in a relatively easy to follow way. Most lecturers provided the state-of-the-art and the state at the practice in the topic they covered. Some suggested that it would have been more valuable to have a more diverse set of topics.

When asked about what they appreciate most about the event, most of them mentioned the interaction among group members, the networking experience, and the cultural exchange. For the things they like the least, some mentioned diversity of group interests not really reflected by senior researchers, the tightness of schedule, and the changes of schedule.

Participants gave valuable suggestions for improvement. In summary, they suggested more unstructured time in schedule, more time for the development of research proposals, more diversity in the topic covered, and final schedule be nailed down in a timelier manner. The detailed suggestions could be found in Appendix 6.

VI. Conclusion

The PASI-TS took place from July 24 through August 7, 2005 in Toluca and Querétaro, Mexico. The main objective of the PASI-TS was to provide the foundation for enhanced cooperation among transportation researchers in the America and to foster the development of a new generation of transport scientists with a hemispheric and global view of transportation issues and their solutions.

In total, there were 48 participants from 8 countries and 32 different institutions, including 13 (27.1%) senior faculty members, 15 (31.3%) junior faculty members, and 20 (41.7%) advanced PhD students. In accordance with NSF guidelines, half of participants were from the United States.

During the two-week program, technical sessions were held in three different ways: minicourses by senior faculty, lectures by junior faculty, and presentations by PhD students. The topics covered in the technical sessions included transportation planning, transportation economics, transportation policy, traffic engineering and control. In addition, there were four types of networking activities: Strategic Partner Initiative, Institutional Foundations for Pan-American Cooperation, A transportation policy workshop, and technical and cultural tours.

The PASI-TS provided participants unique opportunities of interactive learning and cultural exploration. The main outcomes of the PASI-TS include:

- Advanced lectures and presentations;
- The social network built among the transportation professionals of the Americas;
- Students and junior faculty from each of the seven areas identified their common research topics;
- Enhanced cultural interactions will benefit future communication; and
- Suggestions provided for the future collaboration within the Pan-American society.

Overall, participants appreciated the event and provided good feedback. They also gave valuable suggestions for improvement in the future.

VII. Appendices

Appendix 1. PASI-TS 2005 Committee

Conference Organizers:

Professor José Holguín-Veras- Conference Chairman, Rensselaer Polytechnic Institute, USA
Professor Oscar Sánchez- Co-Chairman, Universidad Autónoma del Estado de México, México
Doctor Jorge Acha-Daza- Co-Chairman, Instituto Mexicano del Transporte, México
Noel Pérez - Assistant Coordinator, Rensselaer Polytechnic Institute, USA
Michael Silas - Assistant Coordinator, Rensselaer Polytechnic Institute, USA

Organizing Committee:

Professor George List, North Carolina State University, USA
Professor Didier Valdes, University of Puerto Rico, USA
Professor Nicolau Gualda, Escola Politecnica da Universidade de Sao Paulo, Brazil
Professor Antonio Novaes, Universidade Federale de Santa Catarina, Brazil
Professor Orlando Strambi, Escola Politecnica da Universidade de Sao Paulo, Brazil
Professor Juan de Dios Ortúzar, Pontificia Universidad Católica de Chile, Chile
Professor Rodrigo Garrido, Pontificia Universidad Católica de Chile, Chile
Professor Sergio Jara-Díaz, Universidad de Chile, Chile
Professor Francisco Martínez, University of Chile in Santiago, Chile
Doctor David Briggs Grupo DBA, Ecuador

Appendix 2. PASI-TS 2005 Schedules

Week 1: Location: Toluca, México

	Monday, July 25	Tuesday, July 26	Wednesday, July 27	Thursday, July 28	Friday, July 29
8:00	Breakfast and	Breakfast	Breakfast	Breakfast	Breakfast
8:30	Registration				
9:00		Minicourse 1	Minicourse 3	Minicourse 5	Minicourse 6
9:30	Opening / Welcome	(by G. List)	(by J. Holguín-Veras)	(by N. Gualda)	(by O. Sánchez)
10:00					H. Unger
10:30	Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Break
11:00		Minicourse 2	Minicourse 4	Jha	Delgado
11:30	Lecture	(by D. Valdés)	(by A. Novaes)	Angel	Dunning
12:00	(by J. Gaitan)			Cetin	Rodriguez
12:30					
1:00	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
1:30					
2:00	Lecture	Meeting: Strategic	Thorson	Centeno	Foundation for Pan-
2:30	(by D. Briggs)	Partners Initiative	Wang	Xu	American Cooperation
3:00	Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Break
3:30	Transportation		Transportation		Breakout
4:00	Policy Workshop I	Meeting: Strategic	Policy Workshop II		Sessions
4:30	(by O. Strambi)	Partners Initiative	(by O. Strambi)		
5:00					
5:30					
6:00	Visiting Toluca	Vising Centro			
7:00	downtown	Mexiquense de Cultura	Visiting Cosmo Vitral	Visiting Metepec	

Note: weekend tours include Visiting Taxco on Saturday and visiting the pyramids of Teotihuacan on Sunday.

Week 2: Location: Querétaro, México

	Monday, August 1	Tuesday, August 2	Wednesday, August 3	Thursday, August 4	Friday, August 5
8:00	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast
8:30					
9:00	Demers	Minicourse 7	Minicourse 9	Minicourse 10A	Minicourse 11A
9:30	Franklin	(by J. Acha Daza)	(by F. Martínez)	(by S. Jara-Díaz)	(by J. de D. Ortúzar)
10:00	Salon				
10:30	Coffee Break	Coffee Break	Transportation	Coffee Break	Coffee Break
11:00	J. Abdullah	Minicourse 8	Policy Workshop III	Minicourse 10B	Minicourse 11B
11:30	S. Jones	(by R. Garrido)	P. Miranda	(by S. Jara-Díaz)	(by J. de D. Ortúzar)
12:00	I. Victoria		M. Figliozzi		
12:30					
1:00	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
1:30					
2:00	Munizaga	Foundation for Pan-American Cooperation	Muñoz	Strategic	Visit to the Instituto Mexicano del Transporte
2:30	Cantillo		Giesen	Partners Initiative	
3:00	Williams		Basso		
3:30	Coffee Break	Coffee Break	Coffee Break	Coffee Break	
4:00		Meeting: Common	Collantes	Strategic	
4:30		Research Agendas	Dominguez	Partners Initiative	
5:00					
					Closing Ceremony

Appendix 3. Minicourses and Workshop Abstracts

1. Juan Gaytan and Elias Jimenez: Inventory supply chain coordination based on common replenishment epochs under dynamic demand with multiple delivery modes

In this presentation the application of Stakelberg game in order to perform the coordination is proposed, which is based on two aspects: the selection of the delivery mode and the definition of supply inventory policies based on Common Replenishment Epochs (CRE). The problem is represented by a bicriteria optimization model. The experience obtained so far solving 400 test problems with one delivery mode and one criterion suggest savings up to 40%.

2. David Briggs: Research Relevance

Researcher, research institution, funding agency, and society are different actors in research activity. They each have different research relevance. In essence, it is important to:

(1) Identify research needs

Needs should be identified in a more rigorous and systematic manner and potential outcomes mapped, quantified (where possible) and qualified against needs.

(2) Systematize an evaluation framework

Consider the development and application of a multi-criteria evaluation framework as an appropriate tool in research project and program formulation.

(3) Relevance is all relative

The relative importance of actors, factors and outcomes will vary from project to project. However, just as practitioners evaluate projects in order to choose between alternatives and to determine priorities for program formulation, so should the researcher evaluate their research projects so that research opportunities and programs are set up with a view to optimizing the use of scarce resources and the relevance of potential outcomes.

3. Orlando Strambi: Transportation Policy Workshop

Game software on Urban Transport Simulation (GUTS) was introduced to the participants. The objectives of this workshop includes: to emphasize the system idear of the unban transport; to show the difficulty to define the “good” transport system and the need for continuous monitoring.

Through this workshop, the game players will finally learn several key steps of the urban transport planning and management, for instance, defining objective, formulating strategy formulation, choosing policy instruments, choosing criteria/indicators, and realizing the need for monitoring and reassessment. The practices will help players enforce their abilities of dealing with the complex transport system.

4. George List: Perspectives on Operations and Control

The fundamental goal of operations is to direct the system to behave in a specific manner. Operations require access to real-time information about the system's status, and depend on circumstances; certain actions may or may not be feasible

The three major concepts were defined and discussed: observeability, controlability, and reachability.

The process of operations and control was described, followed by an example of modeling the airline network and the highway system. Also, Petri Nets were introduced as a modeling option for control.

In conclusion, the objective of operations and control is to minimize degradation in performance subject to: available resources, possible actions, external constraints (regulations), and allowable end conditions

5. Didier Valdes: Urban Transportation Networks

Characteristics of the major players of urban transportation Networks were described: automobiles, transit, trucks and external factors (i.e., land use policies, market, oil prices, available technologies, laws and regulations, and city-state-national level decisions.

Evaluation of train operations based on headways or schedules were discussed through the application to Tren Urbano on headway and schedule-based operational control logics on heavy rail system:

Integration of BRT and train operations simulation of the Tren Urbano Plaza operation at Rio Hondo, Puerto Rico was presented; the objectives are to develop a simulation model to observe system behavior and evaluate alternative settings, and to evaluate how changes in operation affect passengers waiting time and total travel time.

6. Jose Holguin-Veras: New Paradigms of Urban Goods Modeling

Freight is vital for the economy; however, freight modeling is challenging because it is more complex than passenger travel and involves interactions between different players (shippers, warehouses, distribution centers, carriers, receivers, 3PLs, and 4PLs). There are three major dimensions of freight demand: trips (loaded and empties); commodities (weight); volume; and value. They gave rise to two major modeling platforms: trip based models and commodity based models. The advantages and disadvantages of these two models were discussed. Because freight movements are multi-dimensional (e.g., commodities, trips) and by modeling one dimension we, implicitly, disregard the other (commodity flows represent the user side, while vehicle trips are the result of the logistic decisions, i.e., the supply side)

In the short term, potential solutions would be to develop better empty trip models with enhanced depictions of commercial vehicle trip chains; and to develop models to represent the commercial vehicle choice process. In the long run, a potential solution is integrative freight market simulation (a comprehensive framework in which both commodity flows and routing decisions are modeled for an entire area).

7. Antonio Novaes: (1). Financial Analysis of Transportation Projects- Public Private Partnerships (PPPs); 2. Logistics and Transportation Distributing.

Important topics covered in this minicourse:

(1). Financial Analysis of Transportation Projects-PPPs

Project staging is to define optimal expansions and when those expansions should occur.

The objective of risk analysis is to quantify risk impacts on project feasibility. Real options were discussed.

The real option approach has been adopted in a number of applications of PPPs.

(2). Logistics and Transportation Distributing

Modeling approaches: most of districting problems are solved with a discrete mathematical programming model.

Continuous approximation: based on the spatial density and distribution of the demand rather than on precise information on every demand point, which is useful during planning phase of the project and also good for macro evaluations

Voronoi diagrams were used to solve transportation and logistics districting problems.

8. Nicolau Gualda: Modeling Logistics Problems

Logistics problems are research related to location of facilities, fleet allocation to distribution centers, vehicle scheduling and routing. Basic methods and formulations include exact models, heuristics, and metaheuristics. In this minicourse, seven case studies focusing on different methodologies for modeling logistics problems were presented, the formulations were provided with results, discussions and future research.

9. Oscar Sanchez: Improving Public Transportation Services

The motivation is to define a strategy to improve the Public Transportation Services (PTS) in a market without an organizational scheme. The public authority is in charge of providing a PTS that maximize the social welfare (users + firms + regulator). The questions are how to: define the PTS characteristics; Select measures to improve the PTS; and articulating a PTS policy in short and medium term.

A case study was discussed, which includes the following important components:

(1) Analyze the PTS organizational level (supply and demand analysis);

(2) Identify the Quality Service (QS) factors or attributes (focus group + revealed preferences survey);

(3) Hierarchy of QS factors (ranking procedure);

(4) Evaluate the “weight” of each factor (experimental design + stated preferences survey + econometric discrete choice model adjustment); and

(5) Define measures to improve PTS.

The results show that from the considered subjective attributes, the buses’ conditions, the driver’s driving way, are in that order the most important for the users. The service

physical attributes such as fee and travel time are also considered, being the cost factor the most important one in the case of a linear utility specification.

10. Jorge Acha-Daza: Application of Catastrophe Theory to Traffic Flow Variables

By using real traffic flow data, this work describes how catastrophe theory can be used to represent the relationship among the main traffic flow variables. The lecturer was able to show that Catastrophe theory can be used for explaining the relationship between the three main traffic flow variables; and describe a way to transform speed, flow and occupancy, and to apply catastrophe theory.

11. Rodrigo Garrido: Hazardous Waste Logistics: Strategic and Tactical Decisions

The problem was defined in such a way that the logistics management of a RSW collection and disposal system with the following three stages: collection, hauling, and final disposal. Then the problem to solve is to locate unknown number of Transfer Centers (TC) and Landfills; to distribute the waste to TC and from these to the Landfills; and to choose type of trucks for both journeys. These decisions are simultaneously made to minimize the total system cost.

The problem was then extended to generation and distribution of hazardous waste in an urban context. The mathematical formulation of the model was presented and the application to Santiago, Chile was discussed.

12. Francisco Martinez: New Tools for Urban Planning

Three sets of modeling techniques were discussed. For each one, formulations were presented and results were analyzed

1) Equilibrium

Urban location (RB&SM)

Constraints (cutoffs)

Dynamics: Real Estate Supply

2) Optimization

Regulations and subsidies

Optimum location - schools

3) Integrated Transport - Land Use

13. Sergio Jara-Diaz: The Activities Time Assignment Model System: The Value of Work and Leisure for Germans and Chileans

A pure time assignment model is proposed and applied to a case study, the results indicate that:

(1) Theoretical microeconomic framework is perfectly suited to analyze different type of simples;

(2) Leisure is more valued than the disutility of work by the German sample and the inverse occurs in the Chilean one; and

(3) Longer work periods, longer travel times and poorer quality of both work and leisure in Chile, could explain these differences.

14. Juan De Dios Ortuzar: (1) Metropolitan Mobility Surveys: State of Practice

Urban areas need travel survey data to: a) portray existing conditions; b) help identifying problems related to the transportation systems; c) to estimate/validate models which are quintessential to their planning activities.

A survey should:

- consider stage-based trip information;
- consider all modes of travel including non-motorized trips;
- measure trip purposes at a highly disaggregate level;
- cover the broadest possible time period (24 hours, 7 days/week, all seasons);
- collect data from all members of all households in study area;
- achieve high quality data, robust enough to use at disaggregate level;
- consider an integrated data collection system: household interviews plus O-D data from screen line and cordons

Elements worthy of updating include:

- Trip generation and attraction models;
- Trip distribution matrix;
- Model split;
- Traffic levels in the network;
- Car ownership and household information trends in various city boroughs.

2001 Santiago mobility survey was given as an example: the data collecting process, descriptive analyses and initial findings were described and summarized.

(2) Mixed Logit Models

This presentation started with an introduction of the random utility theory and Multinomial Logit Model, followed by the Mixed Logit specifications, estimation Procedures, and a case study.

Appendix 4. Junior Faculty Lecture Abstracts

1. Manoj Jha: Using Bayesian Networks for Modeling Uncertainty Associated with Vulnerability of Critical Transportation Infrastructure

A Bayesian Networks is developed for modeling uncertainty associated with vulnerability of critical transportation infrastructure. A case study is presented for the city of Baltimore. A discussion of the “Global Terrorism Database”, “Minority at Risk Database” and DHS’s (Department of Homeland Security) educational and research initiatives is also presented.

2. Alejandro Angel: Utilization of Aerial Imagery for Analyzing Traffic Operations and Level of Service

The research being conducted at the University of Arizona is investigating the potential of remotely sensed data, using aerial video, to enhance existing data sources and therefore to improve traffic management. This research has examined the use of digital video, global positioning systems (GPS), and automated image processing to improve the accuracy and cost-effectiveness of the data collection and reduction. The results of the experiments conducted to date suggest that the aerial video may produce estimates of traffic flow parameters that have similar accuracy, but higher statistical confidence and level of detail, than more traditional techniques. Based on these findings, it is conjectured that in the long term, aerial video may become a cost-effective alternative to other forms of traffic data collection.

3. Mecit Cetin: Short-Term Traffic Flow Prediction with Regime Shifts

Regime shifts or structural changes in the time series data have not received much attention in the short-term traffic forecasting literature even though significant improvements in the forecast accuracy can be attained when the prediction models are capable to switch to new regimes. This presentation focuses on demonstrating the advantages of this new modeling approach where the data-generation process is treated as a time series subject to potential discrete regime shifts at some unknown break-points at which the dynamic behavior changes. Consequently, with this description, model parameters need to be updated in relation to the break-points for optimal forecasting. Potential methods for making forecasts are discussed. Implementation of a prediction model based on the Expectation Maximization algorithm is presented. Numerical experiments on actual loop data show significant improvements in prediction accuracy of the new model over conventional autoregressive models with fixed parameters.

4. Grisselle Centeno: Simulation, Analysis and Redesign of Security Check Points at Major Commercial Airports

The objective of this study is to analyze the security screening process through simulation and suggest alternate designs to enhance the service levels and minimize costs. They develop a comprehensive simulation model of commercial airports focusing on security and safety assurance processes. The simulation framework and analysis methods used in the

analysis will be applicable and easily transferable to study other commercial airports in the State of Florida, around the country and internationally.

5. Anne Dunning: Characteristics of Transportation and Transit Initiative Planning for Recreational Areas

Recreational areas have special transportation needs and characteristics that require consideration and planning outside the traditional metropolitan transportation planning practices. This discussion of transportation recreational areas draws from dissertation work on transit in national parks. The conference session presents characteristics of recreational community transportation systems, as well as the planning and performance monitoring system developed for introducing public transit to recreational areas in and around national parks.

6. Steven Jones: Rural Transportation and Air Quality: Who You Gonna Call?

In this presentation, the relationship between rural traffic and air quality was discussed and the research suggests that rural interstate traffic attributes to ozone formation: (1) Potential for substantial ozone formation; (2) degree of photochemical activity suggests potential for substantial formation aerosols and other products such as peroxyacetyl nitrate (PAN); and (3) heavy-duty diesel trucks play a significant role in rural ozone formation.

In essence, the author concludes that transportation-attributable air pollution in rural areas is not something to ignore; there is link between emissions at roadway and immediate environmental impacts not fully understood. More work on dispersion, transport and uptake should be conducted (e.g., deposition); and scale issues need to be resolved. Also, there is fertile research ground in developing countries (e.g., World Bank, regional development banks).

7. Marcela Munizaga: Modelling Time Assigned to Activities: Estimation Possibilities from a General Framework and an Ad-hoc Database

In this presentation, the model was first presented followed by data requirements, then data collecting, understanding, describing, as well as model estimate and results. This model allows evaluating scenarios that affect the explanatory variables, and predict the effect not only in mode choice, but also in time assignment. Possible extensions of the current work would be segmentation by user type, different hypothesis about restricted and free activities, etc.

8. Victor Cantillo: Discrete Choice Models Incorporating Minimum Thresholds of Perception and Valuation of Attributes

The objective of this research is to formulate and specify flexible demand models incorporating thresholds of perception and valuation of attributes in the process of discrete choice, based on the random utility theory framework. The research started reviewing the literature concerning the state of art in discrete choice modeling and several human behavior and decision making theories that has been proposed. Then, for every model postulated is presented its theoretical development and basic hypotheses. Also, required data and the

mathematical and computational procedures needed for its parameter estimation are indicated. In general, the maximum-likelihood method should be used, and the necessary information will come from revealed or stated preferences surveys.

9. Billy Williams: Modeling Approach Selection: The Pressing Need for More Rigor in Choosing between Parametric and Soft Computing Frameworks

The field of transportation system operation and management is awash in data. Fortunately, developing a new branch of applied mathematics is not needed. Unfortunately, the undergraduate and graduate curricula in transportation engineering do not provide a thorough grounding in the fundamentals of mathematical modeling and inferential statistics (at least not in the United States). In addition to outlining the basic issues, this lecture will provide two concrete examples from recent transportation research. The overall purpose of this lecture will be to motivate the need for transportation researchers to establish widely accepted principles for selecting between mathematical and soft computing modeling frameworks.

10. Pablo Miranda: An Integrative Approach to Support Distribution Network Design

Distribution network design was described (plant / warehouse installing, demands, and replenishment from sources), which is a multi-level problem including strategic, tactical and operational levels. A mixed integer programming formulation for the capacitated facility location problem was discussed and extended to incorporate risk pooling simultaneous modeling. Best response functions were proposed with applications to a small example with 10 potential warehouses and 20 customers. Results show that the higher holding costs and/or demand variability, the greater cost saving from simultaneous approach.

11. Miguel Figliozzi: Pricing in Dynamic Vehicle Routing Problems

This work focuses on a precise formulation of the pricing problem considering a dynamic vehicle routing problem, with a degree of uncertainty about customer requests, arrival times, and characteristics. In addition, a carrier must dynamically estimate the marginal cost or price of servicing a new request/contract; each service provided has a monetary reward which is uncertain at arrival time; and carrier's profit depends on the reward obtained and on how effectively the fleet was managed. Problem context/formulation was proposed followed by the discussion of pricing/costing issues, as well as relaxation, applications and extensions.

Appendix 5. PhD Students Presentation Abstracts

1. Ellen Thorson: Solution Methods for the Integrative Freight Market Simulation

The Integrative Freight Market Simulation (IFMS) involves the development of a comprehensive freight transportation demand model which depicts both commodity flows and vehicle trips. The development of the IFMS has two phases: the application of experimental economics to an urban freight transportation market and the development of algorithmic solution methods for the IFMS. The focus of this paper is the development of a solution approach for the network routing problem. A “cluster first, route second” solution approach was chosen because it enabled the balance between pickups and deliveries to be incorporated into the clustering step.

2. Qian Wang: Impact of the Port Authority of New York and New Jersey (PANYNJ) Time of Day Pricing Initiative on Carriers’ Travel Behavior

The objective of this study is to assess the impacts of time of day pricing on carriers’ behavior. It is based on the case study of PANYNJ’s time of day pricing initiative which was implemented in March 2001. Before the time of day pricing, toll rates depended only on type of payments; but after that, toll rates depend on type of payments and time of travel.

The survey analyses show that 19.3% of truck trips changed behavior because of time of day pricing; carriers respond to time of day pricing by implemented multi-dimensional responses involving productivity increases, cost transfers, and change in facility usage; the lack of time of travel flexibility indicates difficulties to shift their current time of travel.

It was found that carriers that changed behavior are more likely to: focus on full truck load service; employ relatively fewer interstate truck drivers; and work in the areas outside of New Jersey and New York.

3. Ning Xu: Behavioral Modeling of the Impacts of September 11th on Intercity Passenger Travel Behavior Using Multinomial and Mixed Logits

This study analyzes the key findings from a survey conducted for a project sponsored by the National Science Foundation to assess the changes produced by the September 11th terrorist attacks on passengers’ intercity travel behavior. The survey gathered a sample of 214 individuals providing stated preference data about hypothetical intercity travel choices. Two sets of behavioral modeling results were estimated, i.e., Multinomial Logit and Mixed Logit. The estimation results indicate that the September 11th terrorist attacks have affected passengers’ travel decision process. These results suggest that, air travel is much more adversely affected by 9/11 compared to the other travel alternatives (train and car), which is consistent with the fact that, after 9/11, people avoid traveling by air either out of fear or because of the increasing security and the uncertainty of passenger processing times at the airport.

4. Isidro Delgado: Methodology to Reduce Injury Level in Run-Off-the-Road Accidents

Single vehicle run-off-the-road accidents account for about one third of the annual fatalities in traffic accidents in the United States. The main focus of roadside safety must be twofold: to keep vehicles from leaving the traveled lane, and to reduce the severity of the crash in the event of a vehicle running off the road. This project started as an effort to prioritize a list of 19 sites because the county government did not have enough funds to improve the conditions on all of them. One preliminary result was that the definition of any engineering solution should wait until an overall risk assessment of each site was obtained. The ongoing research is to establish key variables to implement a discriminant analysis that could provide results in agreement with those already obtained.

5. Jarice Rodriguez: Delay-Based Passenger Car Equivalencies (D-PCE) for Urban Transit Buses Using Field Data

The presentation focuses on the operational performance of buses and quantifies their impacts in traffic streams, particularly at signalized intersections in urban areas. The study evaluates the relationships between passenger car equivalents (PCE) and factors contributing to additional delay. The methodology presented is based on the delay-based PCE approach developed by Zhao & Benekohal (2000). The data indicated that the average D-PCE for a transit bus is 6.44, which is higher than the value of 2 recommended by the HCM 2000.

6. Alixandra Demers: A Probe-based Advanced Traveler Information System in a Midsize Urban Area, Early Results

This presented discusses project background, system design, and preliminary results of a case study performed in upstate New York this past Spring that included approximately 200 participant drivers equipped with GPS, two-way wireless communications, and route guidance technology. Since small to midsize urban areas often have a limited-number of roadways instrumented, probe-based technology was chosen specifically to minimize municipal infrastructure while offering the highest level of data detail. Both subjective (from pre- and post-experiment participant surveys) and objective (from the probe data collected) results were discussed, especially with regard to routes being changed mid-trip to avoid congested links.

7. Joel Franklin: Inference for the Redistributive Effects of Transportation Policies

The presentation demonstrates the application of some nonparametric distributional comparison tools in the evaluation of a transportation policy whose effects are simulated using an integrated urban land use and transportation model system. As a case study, the author considered the peak-period roadway tolls trial for Stockholm, Sweden. When decomposing the redistributive effects of the toll road system itself versus the scheme for redistributing revenue, it was found that the toll system itself has minimal redistributive effect; the overall progressivity or regressivity that is present is predominantly due to the reallocation scheme, with the most progressive scenario being a public transit subsidy and the least progressive being a reduction in the income tax rate.

8. Deborah Salon: Cars and the city? A model of the determinants of auto ownership and use in New York City within the context of residential neighborhood and commute mode choices

The focus of this study is the determinants of the choice of car ownership within the context of the related decisions of residential neighborhood and commute mode choice. Treating all three of these choices as endogenous, the author estimates a discrete choice model using survey data from the Regional Travel – Household Interview Survey that was conducted in the New York metropolitan area in 1997-98. Results indicate that in New York City, both land use and public transport system characteristics are important determinants of the choices of both car ownership and car use for households. For instance, subway availability near home and work has a substantially larger effect on car use for commuting than does income.

9. Jawad Abdullah: Models for the Effective Maintenance of Roadside Features

In this research two models are developed for infrastructure maintenance. On one hand the inspection travel time is minimized, while on the other hand an optimal maintenance schedule is derived over a planning horizon. For a possible solution approach a Genetic Algorithm (GA) is developed, to solve the two models. In addition the Markov Decision Process (MDP) is applied to roadway maintenance to allow for calculation of optimal annual policies over a planning horizon. Future research is needed for the two models to be solved in two stages, or to develop a multi-objective optimization framework to further assist engineers with their strategic planning and fiscal expenditures.

10. Isabel Victoria: A Holistic Approach for the Effective Identification, Evaluation, and Mitigation of the Environmental Justice Aspects of Toll Road Facilities

The objective is to develop an approach to determine disproportionate impacts imposed by toll roads on Environmental Justice (EJ) communities. The discussion of regulatory framework implicates that there is no specific guidance for analysis.

In the SH-130 case study, the spatial distribution of population groups in the study area was identified. Sensitivity analysis suggests that: 1) the spatial distribution of target and non-target minority/low-income populations within the study area changed when the scale of geographic analysis; 2) TAZs used in travel demand modeling might overlook smaller minority/low-income population groups; 3) a more comprehensive spatial distribution of the EJ communities was obtained at the block level; and 4) an innovative approach that consider all minority/low-income population groups, regardless of their size (as required by FHWA), to build analysis zones.

11. Maria Muñoz: Metropolitan Corridors for the Hazardous Materials Transportation in the Metropolitan zone of Mexico City

This study is to propose and apply a methodology for analyzing hazardous materials corridors for the Metropolitan Zone of Mexico City (MZMC), by means of the systematization and analysis of territorial information using: GIS, multi-criteria analysis, network models (traffic assignment, shortest paths) for determining congestion levels, and

dispersion models. In summary, the proposed methodology for analyzing population at risk has been applied to the MZMC. The methodology has been improved for including analysis which could be possible considering the limited available information.

12. Ricardo Giesen: The On-Line Inventory Routing Problem: Strategies under Real-Time Information

The Online Inventory Routing Problem (OIRP) is formulated taking into account explicitly real-time information about state of the system. Efficient operational strategies for coordinating transportation and inventory control operations under real-time information are developed, and the benefits of the proposed strategies and the value of using real-time information are evaluated.

Simulation results show that on-Line Strategies RDE (Re-plan at Delivery Epochs) and RDE+div (RDE + Plans are updated when demand disruptions occur. In this strategy, the truck could be diverted):

- (1) Decrease average total cost by 21% vs. benchmark
- (2) Decrease variability in average cost
- (3) Benefits tend to be higher when clusters of customers are close to each other and/or near to the depot.
- (4) Benefits of sophisticated strategies tend to increase with higher inventory costs and slightly with greater demand variability
- (5) The possibility of diversions does not report significant benefits; however lost sales tend to be smaller.

13. Leonardo Basso: Economic Analysis of Airport Pricing and Privatization

Airline privatization is first introduced and discussed. A vertical structure-airports upstream, airlines' oligopoly downstream was considered in this study, Then airlines sub-game is solved, airports' demand is obtained, and airports market is analyzed (effects of ownership on prices and capacities)

Four cases are analyzed: 1) System of Private Airports (SPA); 2) System of Public Airports (W); 3) Max Joint Profits, Airports and Airlines (JP); and 4) Independent Private Airports (IPA, IJP). Analysis results show that privatization induces important allocative inefficiencies; the collaboration argument seems to be overstated; W airport charges increase with N: congestion effect dominates market power effect as N increases; Delays (SPA) < Delays (W) < Delays (TPT) at least up to N=10; W: subsidies may be very high when N small; and budget adequacy of W airports may be possible.

14. Jose Ramon Dominguez-Molina: Objective Based Design Selection in Multinomial Logit Models

Concepts of Multinomial logit models were first introduced, followed by the choice experiments and the model of a price sensitivity study. Optimality criteria and the design problem were presented as well as the examples.

It was concluded that: (1) optimal designs for nonlinear models are always “local”. Its properties will depend on the quality of the prior information available or the sample size of the pilot test; (2) the proposal is flexible: It is not restricted to the existence of particular designs based on balance; (3) it is “objective-focused”. In their case the authors used the minimization of the variance of elasticities of interest; and (4) usual orthogonal designs play a very good role when the products do not show a strong variation in elasticities.

Appendix 6. Suggestions for Improvement

Lecturers provided valuable suggestions for improvement:

1. Not coincident with TRB. A bit more unstructured time in schedule. A little more balance over scope at transportation research. However, Great Job!
2. Some of the work-group instructions need to be made clear, so that participants can work better as well as manage the resources accordingly.
3. Less lectures. More group interactions and concept and proposal development. Maybe respond to mock RFP's and present before mock panels. This would foster more development interaction and less guidance time.
4. More time for preparation of the proposal, better class structure, a little more free time.
5. To ask for a clear confinement from participants; to avoid the use of computers while lecture is being presented.
6. Not much. Presenters should not assume that everybody is completely knowledgeable about their presentation subject.
7. To do it every two years and a better planning at activities.
8. To extend the network through more countries; I think 10 days is enough; There were several changes in schedule, that is an aspect of improvement; more participants of senior faculty in group discussions, their experiences are valuable.
9. Junior faculty be given more than half an hour for presentation and senior faculty time be reduced little bit. Students should have been mentioned better by faculty.

Participants also provided valuable suggestions for improvement:

- 11: Develop a research and network web based system where PASI-TS members can get informed of discussions, research papers and events.
- 12: Things are going to improve for the next one.
- 13: Input from practitioners who execute the models; a visit to the host city to see their systems in operation; to grant the senior faculty more time to establish criteria by which research proposals will be adjudged.
- 14: Include PhD students and professors for other countries (Canada, Venezuela, etc.); avoid the use of laptops in the mini courses.
- 15: Adding more time for the partnership initiative in terms of group discussion, and presentation preparation. Senior faculty should be involved more in the partnership discussion.
- 16: More social activities that promote interaction between participants and avoid segregation; Participants should be required to assist to every lecture; better transportation service.
- 17: More time for the development of research proposals.
- 18: Excellent organization and quality overall; Excursions also provide learning experiences, e.g., toll road prices and facilities, road infrastructure, public transit; We could

ride more transit, have transport-related excursions, etc. This would take a lot of work! What are the plans for follow-up?

19: That the senior faculty must be more flexible with the junior faculty, because the research sometimes (if the advisor is not in the right way) they make fell the mistakes so useful, and the junior faculty are learning.

20: More diversity in areas of research interest and faculty nationalities.

21: More diversity in the topic covered during the PASI-TS; A better/stronger commitment of my peer when a research idea is developing.

22: Opportunities for ongoing interaction with this co-host; realistically, the organizers put together an outstanding and productive event.

23: Estimate bus driving timer better; more away from TRB deadline.

24: For a first time event, I think things were very well and I understood the difficulty in nailing down the details. But, in the future, it would be better if the details were nailed down in a more timely manner.

25: segregate may be in two groups of the sessions.

26: the organization needs improve, schedule changes should be printed to participants; the room distribution needs consider participants physical condition.

27: Have more cooked food options for the meal.

28: a better organization about the schedule.

29: It would have been very useful to have an introductory lecture about Mexico in general and its transport system.

30: more transport planning/policy topics/handouts for lectures, make papers available before lectures and also more info ahead of time on topic so we can read before to better follow, more structure for proposal exercises we all had a great experience.

31: In the future, research proposals could possibly be developed in response to an RFP developed for this conference.