

The cover features a composite background. On the left, a dark, industrial interior with a complex steel truss structure is visible. On the right, a man in a red jumpsuit stands on a metal walkway, looking out over a city skyline at night. The city lights are reflected in a body of water, and a large, illuminated dome structure is prominent in the mid-ground. In the foreground, a busy highway with traffic and a parking lot with many cars are visible. The overall color palette is dominated by purples, blues, and oranges from the city lights.

Annual Report 2009-2010

research
education
outreach

METRANS develops and examines solutions to the transportation problems of major metropolitan areas using a multi-disciplinary approach that blends engineering and the social sciences.

METRANS
Transportation Center
USC | CSULB



Improved mobility, one of METTRANS' focus areas, is a chief concern in Southern California and other large metropolitan areas.

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Director's message

We are pleased to present our 2009-2010 Annual Report. We typically begin composition of the Annual Report by reviewing last year's report, and inevitably we ask ourselves how we can possibly show progress, given all the accomplishments of the previous year. We then start putting together the events and activities of the past year, and before long it becomes evident that we have had another even more productive year. This year is no different. We have awarded another round of research projects, conducted conferences, and issued many publications. Our faculty and students continue to win awards and scholarships. Even in the current job market, our students are being placed in universities, public agencies, transportation consultant firms, and in the offices of elected officials.

As is our practice, we continue to innovate and explore new opportunities. As you will see, we have joined forces with other UTCs and organizations to expand our outreach efforts. We have increased our activities in workforce development and professional training. Last year we decided to experiment with a new format for this annual report. It was a great success, even earning a national design award! Needless to say, we've decided to keep the new format, with only minor refinements.

METRANS has been fortunate in having a stellar leadership team. Our accomplishments are the result of dedication and commitment by everyone involved. I want to take this opportunity to recognize and thank Joe Magaddino, long time member of the METRANS Executive Committee, who ended his service this year. As Chair of the Department of Economics at CSULB, Joe pursued the development of the Master of Arts in Global Logistics degree. He convinced his dean and the university that transportation education and research is a worthy area for investment, and the presence of METRANS helped him make the argument. As a result, he was able to hire three faculty in transportation economics during his tenure. We wish Joe all the best as he begins his move to retirement.

Genevieve Giuliano
Genevieve Giuliano
METRANS Director



Genevieve Giuliano
METRANS Director

Summary of Accomplishments

This Annual Report covers the eleventh year of METRANS. We have highlighted the year's accomplishments.

METRANS Participates in DOT Reauthorization Tour

METRANS helped organize an unprecedented meeting to gather federal, state and local officials, transportation system managers, commuters and other stakeholders to discuss needs, priorities and constraints for the upcoming surface transportation reauthorization – in the process revealing some of their own priorities.

For the third stop on the Surface Transportation Reauthorization Outreach Tour, US Department of Transportation Secretary Ray LaHood brought his leadership team to the Los Angeles meeting, including Administrators from agencies such as the Federal Highway Administration, Federal Motor Carrier Safety Administration, Federal Railroad Administration, Federal Transit Administration, National Highway Traffic Safety Administration, as well as his Assistant Secretaries. The February 19, 2010 meeting, held in the Los Angeles County Metropolitan Transportation Authority's Board Room, was an invitation-only session headlined by LaHood, as well as LA Mayor Antonio Villaraigosa, Representative Lucille Roybal-Allard and Senator Barbara Boxer. In addition to representing California, Boxer chairs the Senate Environment and Public Works Committee, which will play a key role in development of the reauthorization bill.

"I'd never seen this before – to bring your entire leadership on the road," said Genevieve Giuliano, METRANS Director.

"We were thrilled to get a call from DOT asking us to help organize a broad representation of stakeholders, including user groups – not just a room full of managers and lobbyists," she says. "But I'm not sure the DOT people understood how huge the LA region is, so even an invitation-only venue for 300 people was nothing compared to the number of stakeholders that could have attended given that the Secretary, the Senator and every single modal administrator would be there."

Federally funded surface transportation programs throughout the United States, which include rail, highway, inland waterways,

and intermodal facilities are covered by the 2005 Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (Public Law 109-59; SAFETEA-LU). The legislation covers operation of the entire federal transportation system and allocates funds from the highway trust fund collected through fuel taxes and tire excise taxes. (It also underwrites university transportation centers such as METRANS.) This bill expired in 2009 and operates on a continuing resolution until the end of this year. The reauthorization process –



USDOT Secretary Ray LaHood, Senator Barbara Boxer and LA Mayor Antonio Villaraigosa. Photo by Gary Leonard - Courtesy of Metro 2010 LACMTA

writing the next surface transportation bill – is the complex reformulation of national transportation policy with the inevitable negotiation over competing visions and inadequate resources.

"What the next transportation bill will look like is up for grabs," Giuliano explains. "Everybody – every state; every mode – wants something out of this bill when congressional committees start generating an agenda. And there's really no consensus on what should constitute a reasonable federal program at this time, given the limited funds existing taxes will generate."

The DOT's six-stop "listening tour" also included events in New Orleans, Minneapolis, Houston, Bismarck ND and

Washington DC between December 2009 and July 2010. "USDOT is particularly interested in ideas that will improve the effectiveness of transportation programs with respect to safety, livability, economic competitiveness, environmental sustainability and the state of good repair of transportation infrastructure," read the invitation letter to the LA meeting.

Giuliano sees the Obama Administration's approach to surface transportation as very urban, shaped by the experience of eastern cities with long histories of public transportation, strong



Transportation students at DOT reauthorization tour with METRANS director, Genevieve Giuliano.

downtowns and walkable neighborhoods, she says.

"Coming to LA – the second largest metropolitan region in the country – is symbolic of that. They came here

because this is a hotbed of urban transportation problems and creative solutions, in terms of both passenger and goods movement."

"They have a metropolitan view of surface transportation, oriented to the types of policies and development that would support public transportation, and aware of the connections between the way cities are structured and the way we travel. For the first time, for example, DOT is partnering with HUD and EPA on a livability initiative to think about how they can develop more coordinated urban policies to help solve transportation, housing, and environmental problems."

New Research Projects

In response to the 2009-2010 RFP, 12 projects were approved with total funding of about \$1 million (\$999,019). We have now funded one hundred eleven researchers, from more than twenty departments. Results of METRANS research have been presented at conferences in urban planning, civil engineering, public administration, computer science and electrical engineering, as well as the TRB Annual Meeting and other transportation conferences. METRANS research is published in a similarly broad array of academic and professional journals. This year, 41 researchers published 87 papers in academic journals.

Faculty Awards

This year three faculty won national awards: Petros Ioannou (USC), Martin Krieger (USC) and Viktor Prasanna (USC).

Student Awards

METRANS students also continue to win many awards. We take particular note of our two Eno Fellows, Laurie Kaye Nijaki and Mohja Rhoads, both PhD students in School of Policy, Planning, and Development, and our many fellowship and scholarship winners – seven at USC and seventeen at CSULB.

Marine Terminal Operations Professional Program

This comprehensive training program was developed by the Center for International Trade and Transportation at California State University, Long Beach in collaboration with Marine Terminal Operators (MTOs). The program covers all aspects of terminal operations and increases career opportunities for individuals seeking entry into this dynamic industry. Students will gain the critical knowledge and skills required by marine terminal operators worldwide to thrive in this highly competitive environment.

The MTOP™ program is structured in a modular format allowing participants to select training areas of interest or to complete all modules to earn the MTOP™ professional designation.



Marine Terminal Operations Professional Class during a Site Visit at the Port of Los Angeles.

Outreach

METRANS tackled two critical transportation issues in major conferences this year. In October 2009, we hosted the 3rd METRANS National Urban Freight Conference (NUF) in Long Beach, California. NUF, a biennial event, has become the preeminent gathering of academics engaged in urban freight research and the practitioners who rely upon the research and help make it relevant.

In February 2010, METRANS hosted a workforce development summit titled, "Ensuring the Growth of California's Transportation Workforce: Developing the Right Workers for Today's Challenges and Tomorrow's Jobs." This summit, held in Long Beach, California, was one of several regional summits held around the United States sponsored by University Transportation Centers. The Workforce Summit was a partnership of METRANS, the Mineta Transportation Institute at San Jose State University, and Long Beach City College. This is an example of the emphasis we place on collaboration and leveraging of resources.

METRANS also co-sponsored several additional events and activities including a webinar series designed to showcase UTC research for our Caltrans sponsors. This was an effort coordinated by all of California's UTCs.

METRANS National Urban Freight Conference 2009

October 21-23, 2009
Hotel Maya, Long Beach, CA

METRANS NATIONAL URBAN FREIGHT CONFERENCE – a forum for sharing research on all aspects of urban freight transport, including planning and modeling, impact analysis, and roles of politics and institutions.

The conference includes over 100 presentations based on papers by researchers, industry practitioners, and government representatives from throughout North America, Europe and Asia.

REGISTRATION AND CONFERENCE INFORMATION AT
WWW.METRANS.ORG
OR CALL (562) 985-2876

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Strategic Plan Update: The Los Angeles Test Bed for Efficient Goods Movement

The 2005 Strategic Plan included the development of a “Los Angeles Test Bed” as a major new initiative for the center. The primary purpose of the test bed is to develop and test technologies that will improve the monitoring and management of freight traffic on the surface transportation system. The test bed is envisioned as both virtual and physical. Through research efforts led by Professors Petros Ioannou (USC) and Anastasios Chassiakos (CSULB), much of the virtual test bed has been completed.

The Los Angeles virtual test bed is an integrated set of simulation models that allows researchers and practitioners to evaluate different policies and technologies, changes in infrastructure, emergencies and a wide range of ‘what if’ scenarios associated with goods movement.

The test bed is composed of the following software modules:

TermSim: Simulates container flows in and out of a terminal

Microscopic Traffic Flow Simulator(MTS): Simulates traffic flows on the road network in the Los Angeles/Long Beach ports area, and is based on the VISSIM software

Emissions and Fuel Consumption model: Estimates truck emissions and fuel consumption based on output from TermSim and MTS

Cost-TermSim: Calculates average costs of moving containers through a terminal

The test bed models work as follows. TermSim is used to model the flows of containers in and out of each of the 13 terminals at the LA/LB ports. The results of these separate simulations are combined to generate total container flows within the port area. These flows are fed into the MTS, which simulates traffic conditions on the road network surrounding the ports. The output from MTS is then used to estimate vehicle emissions and fuel consumption for the predicted traffic conditions. The flow of containers at a given terminal is affected by conditions both within and outside the terminal. For example, congestion on roadways approaching the port complex will affect the arrivals of containers at the terminal. Cost-TermSim is used to estimate the costs of any factors that affect container flow and hence performance, from container appointment systems to traffic interruptions.

The virtual test bed has been used in the following applications:

Impacts of damage to critical roadways or bridges from a major earthquake

Development of strategies to reduce impacts of earthquakes by reconfiguring roadways or terminal operations

Impacts of hypothetical security measures on terminal performance and costs

TermSim and Cost-TermSim are available at <http://www-bcf.usc.edu/~ioannou/Software/Index.html> for download and use. Other modules are under further development and will be made available as they are refined and made more user-friendly.

In addition to METRANS, test bed research has been supported by the USC Center for Risk and Economic Analysis of Terrorist Events (CREATE).

Mission

Solve metropolitan transportation problems through multidisciplinary research, education and outreach.

METRANS Theme

Our theme is, “transportation within large metropolitan areas.” We develop and examine solutions to the transportation problems of major metropolitan areas using a multidisciplinary approach that blends engineering and the social sciences.

Our theme defines all aspects of our program. We conduct research in four topical areas, each oriented specifically to metropolitan transportation problems. We often use the Los Angeles Region as our laboratory, and our education programs reflect an urban perspective in approach and subject matter. METRANS outreach and tech transfer are informed by our research agenda and are distinctly urban in orientation.

The METRANS theme is fully consistent with the USDOT Strategic Plan, the USDOT Research and Innovative Technology Administration’s Transportation Research Development and Technology Strategic Plan, and the Federal Transit Administration’s Strategic Plan.

METRANS Research

METRANS conducts research in four thematic areas:

Goods movement and international trade is concerned with how cities can efficiently move goods and provide transportation infrastructure to support economic growth. This thematic area also includes the safety and environmental aspects of goods movement.

Mobility of urban populations addresses mobility problems in large, decentralized metropolitan areas, where many residents do not own automobiles, transit service does not reach all areas and where congestion on roadways is a major problem.

Highway infrastructure is concerned with ensuring and improving the supply of transportation services in metropolitan areas, with an emphasis on providing self-sustaining, environmentally compatible transportation infrastructure that is durable and efficient.

Safety and security addresses risks associated with large metropolitan areas, where the concentration of modal traffic presents risks to pedestrians, drivers, and transit passengers, and where density generates significant vulnerability to both natural and man-made disasters.

Acknowledgement

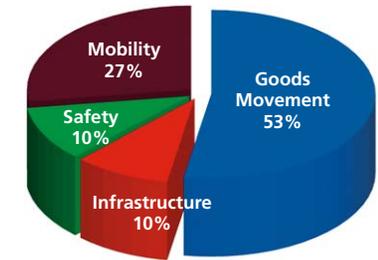
A strong research program relies on outside reviewers to evaluate proposals. We acknowledge the important contributions of our 09-10 referees.

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|----------------------|--------------------------|
| Tankut Acarman | Sotiris Nikole |
| Onur Altintas | David Noyce |
| David Bader | Jean Ospital |
| Michael Baltes | L.O. Oyekunle |
| Andre Boehman | Manish Parashar |
| Julius Bogdanowicz | Doug Popken |
| Alberto Broggi | Charles Prestrud |
| Christina Ca | Srinivas Pulugurtha |
| Pietro Cerri | Humair Raza |
| Ching-Yao Chan | Amelia Regan |
| Paul Corry | Randolph Resor |
| Bart De Schutter | Sandi Rosenbloom |
| Pablo Durango-Cohen | Zissis Samaras |
| Maxmillian Etschmier | Timos Sellis |
| Christos Faloutsos | Atri Sen |
| Ian Friedland | Kathryn Sergent |
| Tony Furst | Steven Silkunas |
| Kostas Goulias | Nadarajah Sivanewaran |
| Sharon Greene | Orson Smith |
| Antoin Guttman | Olaf Stursberg |
| Bahadori Hamid | Janusz Szytko |
| Susan Handy | Brian Taylor |
| Colonel Hoffman | Charles Toth |
| Jose Holgun Veras | Goce Trajcevski |
| Roberto Horowitz | Nam Tran |
| Laureano Hoyos | Mohan Trivedi |
| Taek Jin Kwon | Yicheng Tu |
| Ho Gi Jung | Pravin Varaiya |
| Takis Kasparis | Zhongren Wang |
| Jaeseung Kim | Dane Westerdahl |
| ZuWhan Kim | Tom Wilbanks |
| Douglass Lee | Philbert Wong |
| Marios Lestas | Haojian Xu |
| David Levinson | Jack Youtcheff |
| Li Li | Yufei Yuan |
| Jody Litvak | Christopher Zeppie |
| Jie Liu | Mei Zheng |
| James Marca | Rae Zimmerman |
| Therese McMillan | |
| Thomas Michalke | United States Department |
| Mark Muriello | of Transportation staff |
| Henry Najako | Caltrans staff |
| Do Nam | |

New Research Projects

In response to the 2009-2010 RFP, we received 26 proposals. An outside peer review process is used to evaluate proposals, with final selections made by the METTRANS Executive Committee and approved by CALTRANS. This year, 12 projects were approved with total funding of about \$1 million (\$999,019). Funded projects were distributed across our four thematic areas, with five in goods movement, four in mobility, two in safety and one in infrastructure. Principal and Co-Principal Investigators represented ten different academic departments, reflecting the multi-disciplinary strength of the METTRANS research program.

Cumulative Share of Research Dollars By Thematic Area



The chart above reflects total research funded over METTRANS' history.

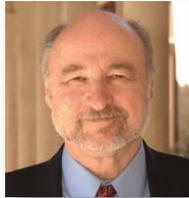
Table 1: METTRANS 2009-10 Research Proposals Funded

Area	School	PI	Co-PI	#	Project Title	Funding
Mobility	USC	Peter Gordon	Quisheng Pan	10-03	Towards Peak – Load Pricing in Metropolitan Areas: Modeling Network and Activity	\$87,745
Safety	USC	Kostantino Psounis		10-05	End-to-End Performance in Vehicular Networks with an Emphasis on Safety and Security Applications	\$90,000
Goods Movement	USC	Josh Newell	Mansour Rahimi	10-06	Moving Containers Efficiently with Less Impact: Dynamic Modeling and Decision-Support Architecture for Clean Port Technologies	\$89,341
Mobility	USC	Constantinos Sioutas		10-07	Measurement and Toxicological Assessment of Population Exposures to Airborne Particulate Matter (PM) in Subways and Light Rail Trains	\$90,000
Goods Movement	USC	Maged Dessouky		10-08	Dynamic Scheduling of Trains in Densely Populated Congested Areas	\$83,033
Mobility	USC	Cyrus Shahabi		10-13	Stream Traffic Data Archival, Querying, and Analysis with TransDec	\$90,000
Safety	CSULB	Chin Chang		10-14	Development of Fiber Optic Sensor Networks for Transportation Infrastructure Monitoring	\$89,180
Goods Movement	USC	Viktor K. Prasanna		10-16	Workflow Synthesis and Management for Integrated Traffic Simulation Experiments	\$88,343
Goods Movement	CSULB	Hamid R. Rahai	Antonella Sciortino	10-20	The Effects of Distortion on Trajectory of Diesel Particulate Matter (PM) from Mobile Sources	\$89,992
Infrastructure	CSULB	Shadi Saadeh		10-24	Development of Quality Control Test Procedure for Characterizing Fracture	\$34,945
Mobility	CSULB	Fei Wang		10-25	Optimize Pollutant Emissions through Adaptive Highway Management	\$77,244
Goods Movement	CSULB	Burkhard Englert	Shui Lam	10-26	The Impact of Truck Repositioning on Congestion and Pollution in the LA Basin	\$89,196

Project 10-03

Towards Peak-Load Pricing in Metropolitan Areas: Modeling Network and Activity

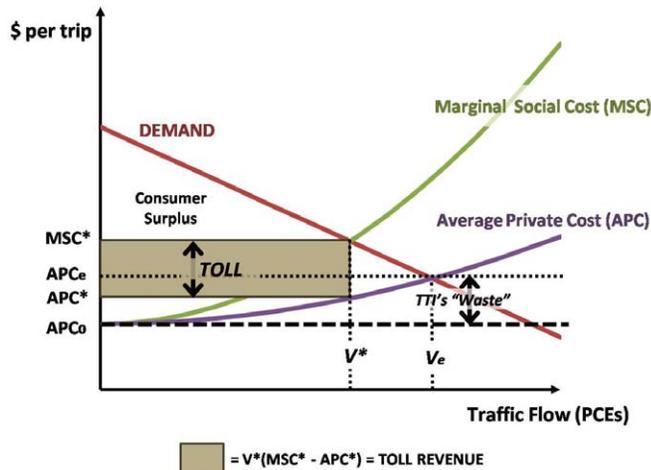
Peter Gordon, USC



If price does not ration, something else will. For most U.S. roads and highways, the pricing option has been avoided and rationing by crowding results. The Texas Transportation Institute reports their annual estimates of the resulting costs. Their recent estimate is that losses amount to \$78 billion per year, or about 40 hours per year per urban traveler.

Transportation economists have long argued for the efficacy of a road pricing policy. But they have, with rare exception, not been able to persuade policy makers. In the eyes of many, pricing is “inequitable.” But things may be changing as recent research suggests shifting public attitudes.

The planning challenge is that in the abstract, typical representation of the standard economic argument in favor of tolls considers a congested road or bridge. But what about a complex physical network in the real world? It is becoming increasingly evident that, as important as pricing mechanisms are likely to become, their impact on levels of service and on net efficiency of an urban network subject to piecemeal tolling schemes are difficult to predict. In addition, very little is known about how development pressures at various locations throughout a large metropolitan region would be affected.



This research addresses two timely and related questions. 1) How can we model the traffic and development pressure effects of implementing peak-load pricing on selected routes in a major metropolitan area? and 2) What are the network and development pressure effects of selected pricing choices, as discovered via an application of the model to the Los Angeles metropolitan area?

With respect to possible development effects, consider that some analysts have pinned “excessive urban sprawl” on the absence of road pricing. There is some theoretical support for this idea, but real-world trade-offs are more complex than the theoretical models can represent. This is why simulations on an actual network are required to address the question. Indeed none of the many extensions of the basic urban model can possibly identify the net result when a complex population of drivers chooses between a set of paths each made up of a variety of links, some of which are priced and some of which are not. Route-choice and time-of-day choice are compared and system equilibrium is achieved when millions of drivers are indifferent at the margin. This is the approach of our model.

Project 10-05

End-to-End Performance in Vehicular Networks with an Emphasis on Safety and Security Applications

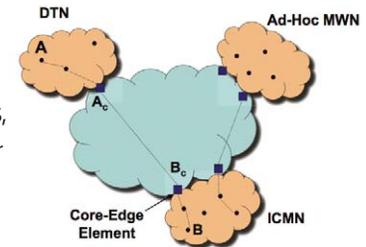
Konstantinos Psounis, USC



In recent years, both the car industry and the government have recognized the tremendous promise of vehicular ad hoc network technology in improving the safety of drivers, passengers, and pedestrians. There are a number of envisioned applications that can both reduce the number of accidents, e.g. via intelligent car to car communication, and the impact of non-avoidable accidents, e.g. via post-crash warnings. The U.S.

Department of Transportation and a number of industry consortiums on both sides of the Atlantic are actively involved in this promising area of research.

It is imperative to design networking protocols that can deliver messages between rapidly-moving vehicles. The challenge comes from the high speeds of vehicles, which renders wireless links between them useless after short periods of time, and the intermittently connected nature of the network, since there is no guarantee that the density of vehicles is going to be large enough to establish contemporaneous paths between senders and receivers of safety information.



This project will use a new approach of communication we term “mobility-assisted communication.” Mobility-assisted communication departs drastically from the traditional view of networking: When a node (moving vehicle or a roadside station) wants to send a message to one or more nodes, it may transmit a number of copies of the message to one or more distinct relay nodes. Each relay will carry the message further, and may transmit it to a new, better relay or directly to a destination. Thus, vehicle mobility is used as an ally to route information between vehicles and stations along the roads. Note that the lack of contemporaneous end-to-end paths complicates all central network functionalities, e.g. routing packets, dealing with congestion, and offering end-to-end reliability.

The objective of this project is to address the challenges related to end-to-end performance. (i) Congestion control: To provide good end-to-end performance, networks employ some form of congestion control to throttle data rates when the network cannot accommodate them. We adopt a “message-oriented” transport approach and design congestion control schemes which work efficiently on top of transport protocols such as TCP. (ii) Interoperability with connected networks: We will investigate schemes to enable end-to-end connectivity when one of the nodes resides in a VANET (e.g. moving vehicle) and the other in a connected network (e.g. a police station). (iii) Network characterization: Finally, affecting end-to-end performance is the inherent heterogeneity in VANETs. Since the level of connectivity may change quickly in space and time, we will design automated distributed mechanisms that allow nodes to characterize how connected the network is on the fly, and select appropriate protocols given the conditions.

Project 10-06

Moving Containers Efficiently with Less Impact: Dynamic Modeling and Decision-Support Architecture for Clean Port Technologies

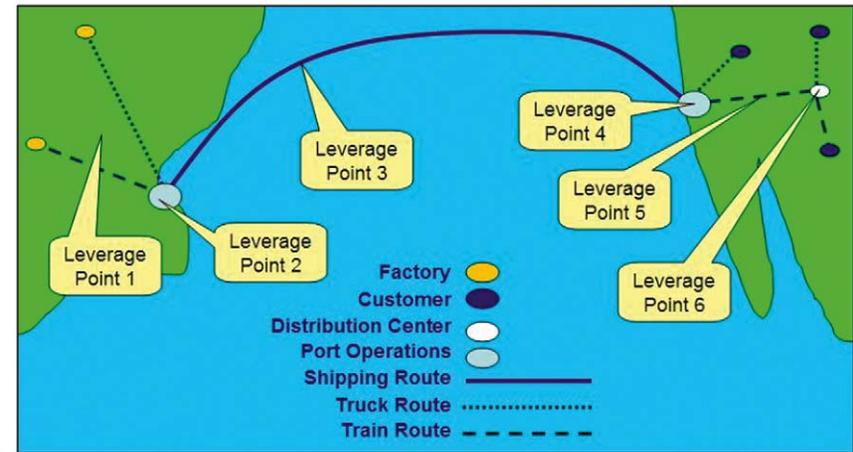
Josh Newell, Mansour Rahimi, USC



Working groups of seaports, major global shippers, ocean freight carriers, and logistics firms are now exploring formation of new clean air policies on a global basis (e.g., the Clean Cargo Working Group). Some transnational corporations are starting to voluntarily calculate their Scope III or indirect lifecycle emissions, which include the greenhouse gases (GHGs) and air pollutants associated with the transport of goods.

Others are faced with new clean air regulations, such as those from AB32. The Ports of Los Angeles (POLA) and Long Beach have responded by adopting the Clean Air Action Plan (CAAP) which will fundamentally alter operations at the Ports and in the goods movement industry in the region.

The proposed research seeks to address these needs by answering three crucial questions: 1) What are the emissions, cost and time factors associated with the transport of a typical



container (TEU) from China to retail distribution centers in the US?; 2) How will the adoption of modal shifts, clean technologies, and alternative fuels affect cost, delivery time, and emissions from the POLA to the Inland Empire and what impact will these strategies have on the overall emissions footprint of a typical US-China container?; and 3) What is the most effective way to make this research accessible to decision-makers in the supply chain?

The project will use a system dynamics (SD) simulation methodology to model the global and regional container movement systems. The variables of interest will be cost, time, geography, technology, criteria air pollutants and GHGs as they interact at the two spatial scales. A major toy manufacturer, POLA, and shipping companies have agreed to provide data for the project. To address the first question, the research team will calculate the emissions, time, and cost associated with transport of a typical TEU from the factory gate in China’s Pearl River Delta to six destination zip codes in the U.S. For these destinations, SD modules will include routing variations and the impact of deploying clean technologies and fuels for each form of modal transport along the supply chain. To address the second research question, we will model the

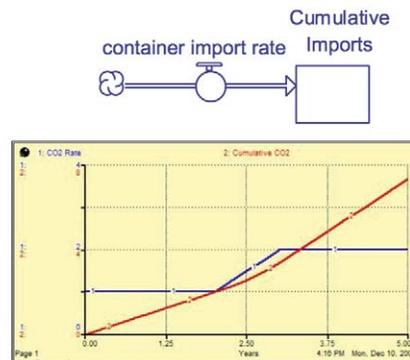
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Project 10-06 continued

container movement in the Los Angeles region – specifically the primary operations of POLA and extending to selected distribution centers in the Inland Empire – and focus on the new programs being implemented or considered under the CAAP and the regional Climate Action Program (CAP).

To make the research results accessible and usable by those who need it most, we will build the prototype architecture for an internet-based goods movement simulation tool. This tool will allow the stakeholders to improve supply chain efficiency by enabling them to locate leverage points that yield the desired change for the lowest cost and shortest period of time.

The architecture will be co-developed and tested through two day-long workshops with these stakeholders to assure validity, reliability, and usefulness. This collaboration process will be convened under the auspices of USC’s Sustainable Enterprise Executive Roundtable (SEER).



Project 10-07

Measurement and toxicological assessment of Population Exposures to Airborne Particulate Matter in Subways and Light Rail Trains.

Constantinos Sioutas , USC

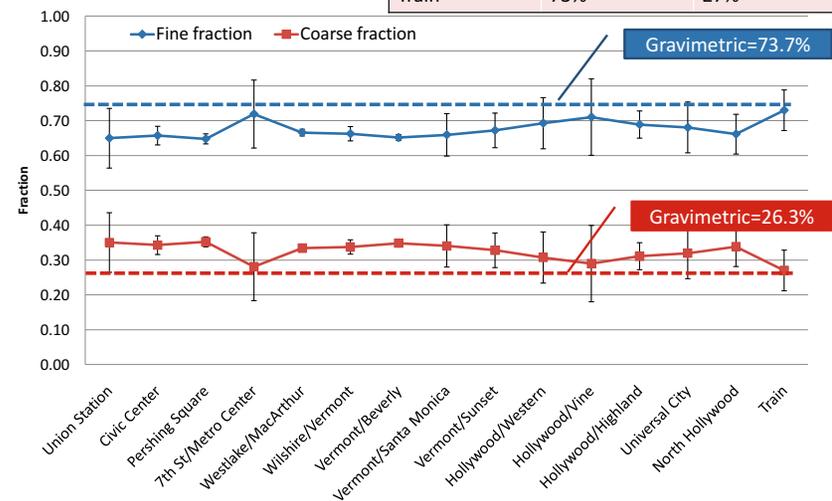
Expansion and increased use of urban public mass transit systems in the future are often portrayed as an unalloyed good with multiple personal, societal and environmental benefits. However, there is increasing evidence that respirable particulate matter (PM) in public mass transit systems is different from urban ambient PM concentrations. PM mass concentrations in urban subway systems have been reported to be up to an order of magnitude higher than at above-ground companion sites. Further, concentrations of metals – particularly iron, and other transition metals such as manganese, chromium and nickel – can be present in concentrations up to 100 times greater than typically observed in urban air dominated by motor vehicle emissions. The primary objective of this project is to make measurements in the

Los Angeles Metro system in order to quantify the chemical composition and physical and toxicological properties of respirable PM concentrations in its subway and light rail system. Observations in other systems may or may not be directly extrapolated to Los Angeles, although they do provide guidance. No systematic observations have previously been made in the Los Angeles transport system whose ridership has increased over 15% in the last two years and is expected to increase further in the future.

The Los Angeles area is a unique environment in terms of the composition and sources of PM, local meteorology, and the potential health issues that may arise from continued population growth. The proposed study will be conducted by performing a series of fixed site and in-transit measurements over approximately a one month period to fully characterize the airborne PM in the subway and light rail systems. The goal of this project is to apply existing field particulate matter measurement capabilities and techniques to the study of ambient particulate matter concentrations in the Los Angeles County Metropolitan Transit Authority’s subway and light rail lines.

Red Line – Fine and Coarse PM Fraction

	Fine fraction	Coarse fraction
Station average	67%	33%
Train	73%	27%



Project 10-08

Dynamic Scheduling of Trains in Densely Populated Congested Areas

Maged Dessouky, USC



In order to make optimal use of their capacity, rail networks in urban areas are extremely complicated, consisting of multiple trackage configurations of single, double, and, in high traffic zones, even triple-track. Another complicating factor of rail networks in urban areas is the existence of multiple speed limits at different points in the network because of physical contours, cross-overs, or other safety considerations as opposed to travel in rural areas where a single speed limit may apply for long stretches of travel. Therefore, there is a need to develop theory and techniques to model and develop policies to streamline operations in these types of complicated rail networks.

Determining the optimal dispatch policies that minimizes train delays and ensures deadlock-free operations is computationally difficult, and conventional optimization techniques are not sufficient. Therefore, most of the research efforts in this direction have focused on developing simple heuristics or detailed simulations to plan dispatching policies. Optimization efforts thus far have only addressed simple trackage configurations like single, double, and partially double rail lines. Complicating entities in a rail system like junctions, crossovers, sidings, speed limits and goods priorities need to be considered in order to extend the current theory and scheduling algorithms to large-scale urban rail networks. The current state-of-the art in scheduling these complicated networks includes only simple insertion type algorithms. To address this need, our proposed research will consist of the following tasks:



1. Development of a simulation model that can be implemented using commercially available simulation software.
2. Development of real-time dynamic scheduling algorithms for complex general rail networks, commonly found in urban areas.

The main impact of the proposed research will have a significant bearing on real-world urban rail operations, many of whose pertinent complexities have been ignored in theoretical studies thus far.

Project 10-13

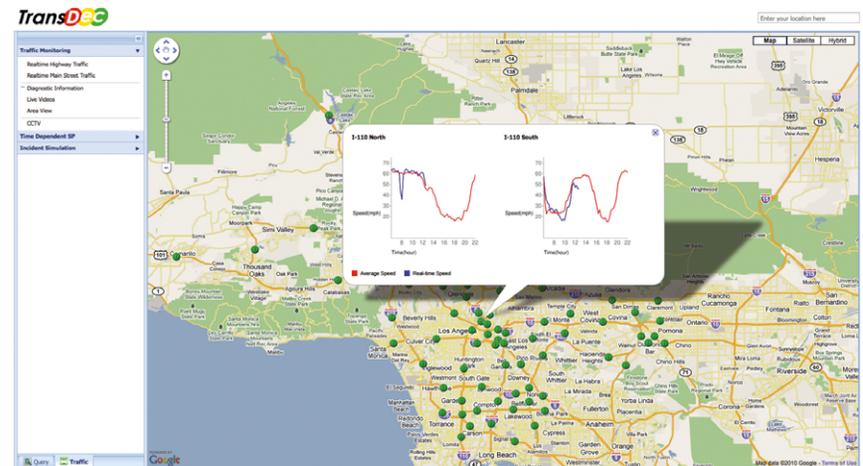
Stream Traffic Data Archival, Querying, and Analysis with TransDec

Cyrus Shahabi, USC



We will extend TransDec (short for Transportation Decision-Making), a prototype system that we are developing under our current METRANS grant. TransDec is a real-time data driven system to support decision-making in transportation systems. With TransDec, so far we have addressed the challenges in visualization, querying and management of dynamic and large-scale spatiotemporal transportation data, in particular, traffic sensors data and moving assets data. We will extend our research and technology development efforts under three specific tasks. First, we will investigate and develop new techniques to create a streaming data archival repository. This repository supports continuous querying and analysis of the vast amount of Southern California transportation data streams collected by RIITS (Regional Integration of Intelligent Transportation Systems). Second, we will extend the current data-tier of TransDec to a distributed design to enable a more scalable and stable computing environment. Finally, to demonstrate the benefits of archiving and querying the streamed traffic datasets in improving urban mobility, we will develop a novel proof-of-concept application, a time-dependent optimal sequenced route planner (TD-OSR), based on congestion prediction. This application will exploit a subset of the real-world RIITS datasets, and will be released for public use.

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During the past year we have been developing TransDec, a data driven system that enables decision-making queries in transportation systems with real-time and historical data. With TransDec, we have focused on visualization, querying and analysis of the large-scale dynamic transportation data including massive traffic sensor readings and moving assets (e.g., buses, trains). In particular, with TransDec, we have enabled users to issue various real-time and historical spatiotemporal queries about a) traffic at specific segments or sensor stations with user defined level of aggregation, and b) moving assets and their navigational (e.g., speed, time-to destination), route, and location-based information. We built TransDec with a three-tier architecture (presentation tier, query-interface tier and data tier) that allows users to create customized spatiotemporal queries through an interactive web-based map interface in support of decision-making . With this architecture, we have addressed the fundamental data management and visualization challenges in effective handling of dynamic and large-scale transportation data.

Project 10-14

Development of Fiber Optic Sensor Networks for Transportation Infrastructure Monitoring

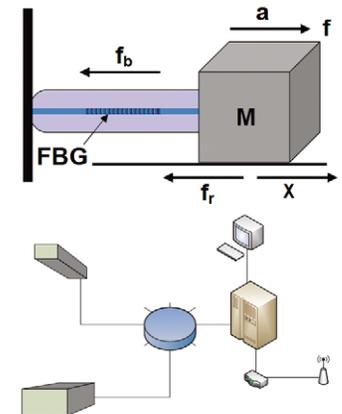
Chin Chang, CSULB



The problem we address is the monitoring and management of transportation infrastructural health utilizing fiber optic sensing technology. Fiber optic sensing technology offers superior performance and extensive capability in structural health monitoring applications. We will conduct comprehensive performance evaluation for point and distributed fiber optic sensors for long-span transportation infrastructural monitoring. Validation of the point and distributed fiber optic sensors will be implemented through laboratory and field tests. A structural health monitoring system using a quasi-distributed sensor network will be then designed, built, and tested for field deployment test. The research team has made an arrangements with Caltrans engineers to conduct a field deployment test transportation infrastructure in Southern California. The field test data will be reviewed and analyzed. The prototype deployed in the field test will continue to collect structural information for technology and design validation. A system design for fiber optic sensor network monitoring and management will be proposed as the end result of the research effort.

In our prior METRANS research project we conducted an extensive investigation on various structural sensing technologies, and found that fiber optic sensing technology for structure health monitoring (SHM) application is still not widely accepted. Field data available from current fiber optic sensor monitoring systems is very limited compared to that from the systems based on conventional sensing technology. Moreover, research and development focuses mostly on measurements in strain, deformation, and temperature; other key structural parameter monitoring is still lacking.

The specific objectives of this project are: 1) to conduct performance evaluation of key fiber optic sensors in the laboratory environment; 2) to design, build, and test a prototype of fiber optic sensor network for structural monitoring in a real field environment; 3) to propose an integrated monitoring system based on results of the field test; and 4) finally, to investigate costs and benefits of fiber optic sensing in this application.



Project 10-16

Workflow Synthesis and Management for Integrated Traffic Simulation Experiments

Viktor K. Prasanna, USC



Globalization, international trade and economic growth have led to an increasing volume of traffic flows by all transport modes. Traffic at ports, airports, rail yards, and warehouse/distribution nodes contributes to congestion, environmental pollution, and traffic accidents and puts tremendous pressure on metropolitan areas to deal with such issues. Advances in information technology, data management and computation tools, together with recent research in systems optimization and control, makes possible new approaches to the freight transportation problem. A prerequisite for proposing any solution that would make the existing transportation system more efficient - especially in complex environments such as in a metropolitan area - is a careful and accurate analysis

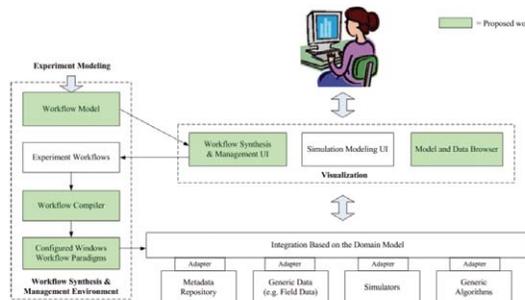
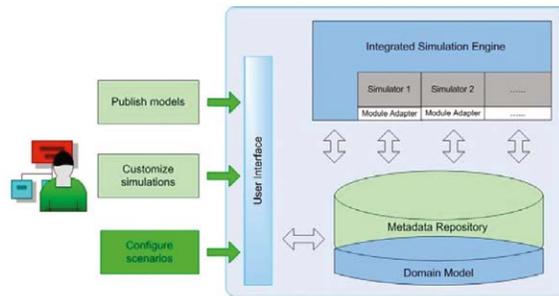
and understanding of traffic flow. This by itself is a very challenging problem due to the presence of multiple modes of transportation which interact and affect each other in a complex manner. What is needed is an environment where all modes of transportation can be integrated together with their interactions, data can be collected and processed in real time, new approaches can be tested and evaluated, the impact of future demands can be analyzed, etc.

In this project we will develop a workflow environment to support synthesis and management of integrated simulation experiments. In a prior project, we developed a simulation framework which supports traffic simulations involving heterogeneous tools such as VISSIM, Termsim and Matlab. As the system evolves to support complex experiments and domain scientists use increasingly complex simulations, management of the experimentation processes and of collected data become important.

These experiments usually involve a variety of tasks like tool integration, target system modeling, data transformation, model validation, results comparison and analysis.

Our proposed system organizes such tasks around scientific workflows which allows domain scientists to model, design, execute, debug, re-configure and re-run their data analysis, management, and visualization pipelines. This dataflow/process-oriented view provides scientists with a simple, high-level model for thinking about the problem and automates solution tasks. We will demonstrate our system using experiments conducted by METRANS researchers such as:

- (i) evaluating the impact of freight at the LALB marine port and local traffic network,
- (ii) integrating algorithms (e.g., ramp control algorithm) in highway simulations and optimizing the overall performance.



Project 10-20 The Effects of Distortion on Trajectory of Diesel Particulate Matter from Mobile Sources

Hamid R. Rahai, Antonella Sciortino, CSULB



Within an urban area, concentration, dispersion and diffusion of pollutants are functions of urban aerodynamics. Our objective is to investigate the impacts of distortion and wind straining caused by surrounding building structures on concentration and dispersion of fine and ultrafine particulates from a moving vehicle. We recently completed a METRANS project on development of an exposure model

for diesel locomotive emissions near the Alameda Corridor railroad. Our research was focused on the distance that the diesel particulate matter (PM) travels in an open non-distorted area when a diesel locomotive passes. Results indicated an average of 12 to 15 % increase in aerosol concentration due to the passage of the diesel locomotives. Within metropolitan areas, surrounding buildings and structures impose pressure gradients on moving emissions that impact PM trajectory and its local concentration. Thus, the next step in our research is to investigate the effects of straining and distortion caused by surrounding structures on diesel PM trajectory and to gather information about the fine and ultra-fine particles from the passage of diesel locomotives near the Alameda Corridor railroad, with and without the distortion. Results of the proposed investigation can be used to develop criteria for buildings systems modifications and for improving indoor and outdoor air quality of the existing residential and commercial buildings near the ports traffic corridor.



Project 10-24

Development of Quality Control Test Procedure for Characterizing Fracture

Shadi Saadeh, CSULB

Fatigue cracking is a major factor in the deterioration of Asphalt Concrete (AC). It is believed that fatigue cracking occurs due to repeated traffic loadings which induce high tensile stresses at the bottom of the asphalt layer. Recently, pavement engineers and researchers have expressed great concern over the cracking of flexible pavements under various traffic loading and environmental conditions.

The development of a quality control test that is simple to conduct, inexpensive to perform and requires no new equipment is investigated. This new test is evaluated through statistical correlation with a more complex, test that is more expensive and requires more equipment. The main objectives of this proposal are to investigate the use of the Semi Circle Bend (SCB) test as a quality assurance/control (QA/QC) measure for field construction; statistically compare the results of the SCB with the current Fatigue Beam Test (FBT); and investigate the influence of various environmental and mixture variables on the results.

The experimental factorial design covers variables that are believed to affect the fracture properties of asphalt mixtures. These variables include binder type and specimen type. Two commonly used binder types, PG 64-10 and PG 64-22, are considered. Specimens with different compaction methods including gyratory compactor and kneading compactor are used. In addition two fracture properties tests are performed, SCB, and FBT.



The outcome of this research will result in many benefits including, reduced reflective cracking in asphalt overlays, reduced maintenance costs, improved resistance to cracking in new pavements, and increased pavement life. The results of the proposed work could also be used to modify the current specifications used in the State of California.

Project 10-25

Optimize Pollutant Emissions through Adaptive Highway Management

Fei Wang, CSULB



The objective of this project is to assess the impact of adaptive highway management strategies on pollutant gas emissions through microscopic computer modeling. Our goal is to optimize the amount of pollutant gas emission by effectively utilizing the intelligent transportation system (ITS) technologies that have already been implemented in southern California. This research will suggest a series of strategies aiming to minimize pollutant gas emissions.

Emissions (e.g. carbon monoxide (CO), hydrocarbons (HC) and oxides of nitrogen (NOx) from gasoline-based vehicles contributes greatly to smog and greenhouse gas emissions. It has been found that the emission rate of these gases varies non-linearly with vehicle speed. While vehicles move at relatively high speed (i.e. greater than 50 mph), the pollutant emission (especially CO emission) increases monotonically with speed of vehicle. On the other hand, when vehicles move at extremely low speed (i.e. less than 20 mph), the pollutant gas emission rate is inversely proportional to vehicle's speed. This non-linear behavior of gas emission indicates the possibility to optimize pollutant emission through smart speed and mobility control on urban corridors.

Although several traffic simulations tools are available commercially for both macroscopic and microscopic modeling of traffic problems, few of them take into consideration the impact of adaptive highway management strategies on pollutant gases emission. In this project we will link pollutant emission with highway mobility through a mathematical model and search for an optimized strategy to minimize emissions. The result of this project will provide detailed suggestions on setting parameters, such as optimal speed limits, threshold level-of-service as well as stop-run intervals of ramp meter.

Project 10-26

The Impact of Truck Repositioning on Congestion and Pollution in the LA Basin

Burkhard Englert, Shui Lam, CSULB



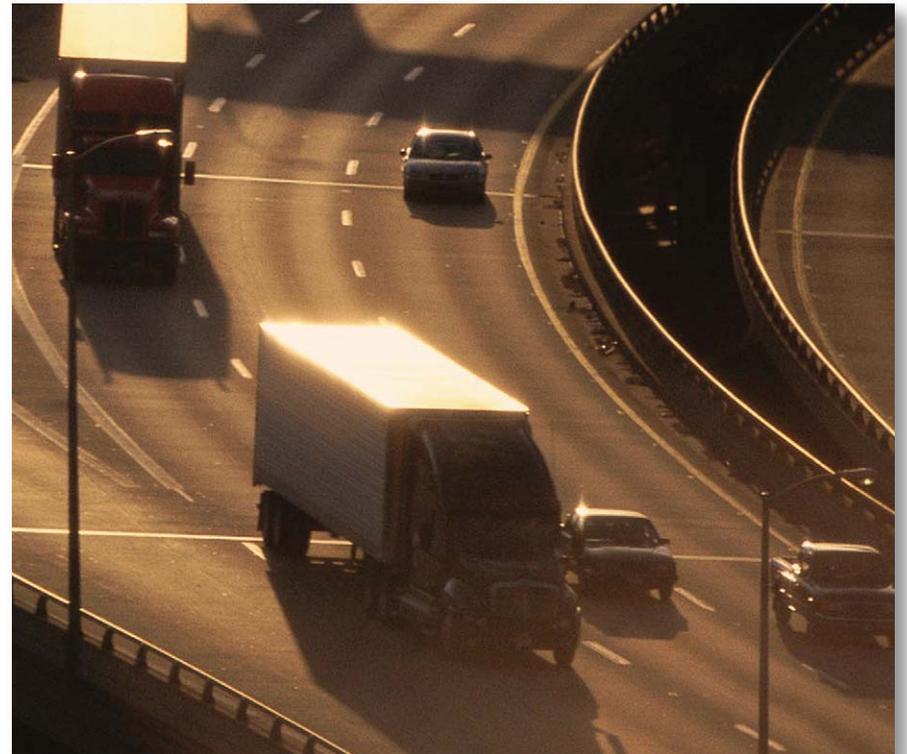
Pollution and congestion caused by port related truck traffic is usually estimated based on careful transportation modeling and simulation. Attention is normally focused on trucks on their way from a terminal at the Los Angeles or Long Beach ports to a delivery point or on their way from a pick up point to a terminal. Most trucks serving the LA/LB ports are currently owner operated. Hence it is very likely that an owner operator will park his truck at or near his home and then drive from there to the ports or a warehouse. These empty, repositioning routes, however, are generally discarded in the overall analysis of a truck's pollution and congestion impact, or at best a simple estimate is used instead. This is reasonable as long as it can be assumed that the drivers live very close to the port.

It is usually assumed that an inland port will lead to a reduction of congestion and pollution near the ports. However, models that are used to study the impact of truck traffic in the region lack several pieces of crucial information that would allow for some adequate modeling. First, there is a lack of data on the distribution of the origin locations of the trucks used for container pickups and deliveries in the Southern California region. This distribution determines the distances trucks must be driven to reposition themselves either at the ports or at a pick up site. What if, for example, truck drivers do not relocate close to an inland port site and hence the length of empty repositioning drives increases? Will the establishment of an inland port at a given location lead to an overall improvement in terms of total truck driving distance and/or time as expected, or a surprising, opposite outcome? And, what about the impact of the longer delivery routes from an inland port on congestion and pollution in the region?

In this project we propose to develop accurate data about the repositioning costs of trucks under current and future conditions. Such data can then be used to develop a transportation optimization and simulation model that includes repositioning drives by trucks in its analysis. We will first survey truck drivers and trucking companies to determine the locations where trucks are currently parked when not in use, and then determine a driver or trucking company's willingness to move closer to a place such as a future inland port where most of their business transactions will be conducted. Using the survey results we will develop a discrete choice model to predict this willingness. Second, based on these findings and using a Southern

California regional travel demand model we will modify and enhance our transportation least cost network flow optimization model to determine the consequences of their potential decisions. Using the EPA's DrayFleet model we will analyze the pollution impact of several possible repositioning and container distribution scenarios. We will also develop a dual objective optimization to analyze the resulting net impact on congestion and pollution in the LA basin under different assumptions about potential truck driver behavior. With our models we will develop several example scenarios that will allow us to test different hypotheses associated with inland ports.

The results of this study will be an invaluable tool for the test of hypothetical scenarios and hence for future planning in the greater Los Angeles region. These results will provide all parties with verifiable input on how to best proceed in a manner that will help to reduce congestion and pollution at the ports and hence provide crucial information to help improve the efficiency of goods movements and potentially lead to a decrease in pollution.





Los Angeles Metro Bus Riders

Bus riders on the Los Angeles Metro system (Bus #550, 20, 720, 81). Photographed by METRANS PI Martin Krieger as part of his Urban Tomography projects.

Recently Completed Projects

Over the past year, 14 projects were completed. Of these, seven were in goods movement, three were in mobility, three in safety and one in infrastructure. Projects are first submitted in draft form for peer review before being produced in final form. Completed projects are listed in the table below.

Table 2: Completed Research Projects, 2009-10

Area	Principal Investigator	Co-PI	Project Title
Infrastructure	James Moore II		Improved Modeling of Network Transportation Flows, Including Land Use-Transportation Interactions: A Research Collaboration Between USC (METRANS) and Caltrans District 7 (Office of Advance Planning)
Goods Movement	Petros Ioannou	Anastasios Chassiakos	Simulation Test Bed and Evaluation of Truck Movement Concepts on Terminal Efficiency and Traffic Flow
Safety and Security	Najmedin Meshkati	Mansour Rahimi Jalal Torabzadeh	Study of the Exposition Light-Rail's Safety for Pedestrians and Drivers
Goods Movement	Niraj Verma		Institutional Considerations in Freight Movement in Port of Los Angeles/Long Beach
Mobility	Christine Jocoy		The Mobility of Homeless People and Their Use of Public Transit in Long Beach, CA
Mobility	Wade Martin		A Computable General Equilibrium Model of the Southern California Economy: The Ports, Transportation and the Environment
Goods Movement	Mansour Rahimi		Integrating Inland Ports into the Intermodal Goods Movement System for Ports of Los Angeles and Long Beach
Safety and Security	Tridib Banerjee		Pedestrian Safety of School Children: Toward Improving Walkability of Inner City Neighborhoods
Goods Movement	Hamid Rahai	Bei Lu	Development of a Portable Remote Sensing System for Measurement of Diesel Emissions from Passing Diesel Trucks
Goods Movement	Seiji Steimetz	Steven Yamarik	Accident Rates and Safety Policies for Trucks Serving the San Pedro Bay Ports
Goods Movement	I-Hung Khoo	Tang-Hung Nguyen	Study of the Noise Pollution at Container Terminals and the Surroundings
Mobility	Fei Wang	Xiolong Wu	Microscopic Model of Road Capacity and Risk for Highway Systems in Port Based Metropolitan Areas
Safety and Security	Chin Chang		Fiber-Optic Smart Structures for Monitoring and Managing the Health of Transportation Infrastructures
Goods Movement	Kristen Monaco	Guy Yamashiro	Transportation Forecast for Southern California

METRANS Research Impacts

The scholarly significance of METRANS research is reflected in publications. In 2009-10, METRANS research resulted in publication of 14 transportation research reports and 87 refereed journal papers.* Research results were presented at engineering, urban planning, regional science, political science, logistics, and transportation conferences. Publications appear in an equally broad range of scholarly journals.

METRANS research also informs practitioners and policy-makers. Research results are disseminated at professional meetings and conferences, through METRANS News, our website, and distribution of reports to federal and state government agencies.

Fourteen projects were completed over the past year. The following section highlights just a few. Final reports from all completed projects are available on our website.

*based on 41 faculty reporting.

Thematic Area: Goods Movement and International Trade

Simulation Test Bed and Evaluation of Truck Movement Concepts on Terminal Efficiency and Traffic Flow

Petros Ioannou, USC; Anastasios Chassiakos, CSULB

The elimination of international trade barriers, lower tariffs and shifting centers of global manufacturing and consumption has led to new dynamics in intermodal shipping. Worldwide container trade is growing at a 9.5% annual rate, and the U.S. growth rate is around 6%. It is anticipated that the growth in containerized trade will continue with predictions that US port trade will at least double by 2020.

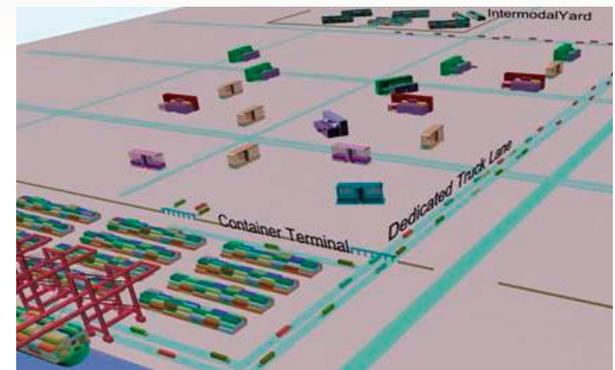
The situation becomes more challenging for the three main container port complexes on the West Coast (Long Beach/Los Angeles, Seattle/Tacoma and Oakland), which handle almost 50% of the container traffic in the United States. In particular the combined ports of Long Beach/Los Angeles, the largest container port in the nation, handle 33% of the total container traffic in the US. To accommodate the huge amount of freight and reduce cost per TEU container, shipping companies have ordered faster, larger and deeper ships.

Marine terminals are in need of additional capacity in order to handle these increasing demands. In metropolitan areas such as Los Angeles/Long Beach, the scarcity and high cost of land forces the terminals to increase capacity by using advanced technologies rather than expanding in square footage. Higher efficiency within the terminals however could imply more truck

traffic in and out of the terminal that will lead to more congestion on the roadway network adjacent to the terminals. This traffic congestion will, in turn, have a negative effect on the efficiency of the terminals, as well as increased pollution. It is therefore clear that the efficiency and capacity of the terminals cannot be decoupled from the effect on congestion on the traffic network outside the terminals.

In this study we develop a simulation test bed that allows us to investigate the impact of various technologies and concepts on terminal capacity and cost as well as on the traffic network outside the terminals in an integrated manner. The test bed is of general use and could be employed to evaluate a wide range of concepts and technologies associated with terminals and ports and the traffic network surrounding them. The test bed is used to evaluate and analyze truck movement concepts that include the use of an inland port with dedicated truck lanes; empty container reuse strategies; and centralized processing and use of chassis.

The test bed consists of three modules: TermSim, TrafficSim and TermCost. The TermSim module includes the simulation of operations within the



The ACTIPOT concept

terminal and at the interfaces. The TrafficSim module includes the simulation of trucks, vehicles and traffic flow on the roadway network outside the terminals. TermSim interacts with TrafficSim at the interfaces. The TermCost module is a cost model developed by the authors for cost evaluation of terminals and is used to evaluate the concepts under consideration. The TermCost module interacts with TermSim. An inland port concept and empty container reuse strategies are evaluated using the test bed in order to investigate and quantify their effect on the terminals and the traffic network outside the terminal. As a specific example, the traffic network surrounding a terminal in the Los Angeles/Long Beach port is used to demonstrate the use of the test bed in evaluating and quantifying benefits associated with the use of an inland port and empty container reuse strategies. In addition the test bed is used to perform a preliminary study of the concept of centralized processing and use of chassis.

Thematic Area: Goods Movement and International Trade

Accident Rates and Safety Policies for Trucks Serving the San Pedro Bay Ports

Seiji Steimetz, Steven Yamarik, CSULB



About 87% of the truck drivers who haul ocean containers to and from the San Pedro Bay Ports are independent owner operators known as dray drivers. There is a general impression that dray drivers are inherently more dangerous than other operators of heavy commercial trucks. Some argue that a combination of low wages and fierce competition among the roughly 16,000 dray drivers serving the ports leave them with no choice but to relax their safety standards. These drivers, who are paid by the load and seldom compensated for traffic delays and waiting times, earn an average wage of \$8.90 per hour even before considering truck maintenance expenditures. As a spokesman for the Owner-Operator Independent Drivers Association puts it, "If you want good, clean, and safe equipment, the costs for it have to be reflected in the rates that truckers receive for moving the products."

One might argue, however, that drayage traffic is no more a threat to highway safety than traffic generated by other sectors of the motor carrier industry, noting that the motor carrier industry in general is highly competitive. Although dray drivers might be able to cut costs by postponing safety measures or improve the number of containers they haul by driving more dangerously, doing so increases their chances of incurring accident costs.

This study estimates three distinct measures of truck-related accident risk for several California urban highways, based on a monthly panel of accident and traffic data spanning from January 2007 through April 2010. The first of these risk measures is average risk, defined as the number of accidents divided by total traffic volume. The second is marginal risk, defined as the change in average risk resulting from a marginal increase in truck traffic volume. The third is external risk, defined as the product of marginal risk and total traffic volume.

Special attention is paid to comparisons of these risk measures between drayage routes, which carry the highest concentrations of drayage traffic, and other urban routes.



Map View of Drayage Routes Source: Google Maps.

Overall, our findings lend a degree of credence to the notion that drayage routes are relatively hazardous, based on their average-risk rankings, providing indirect evidence that dray drivers might indeed contribute to relatively high accident risks on the routes they travel most. Our findings also suggest, however, that safety policies which exclusively target their routes may not be warranted because, at the margin, greater risk reductions could be achieved by altering truck flows on several other routes. One particular policy that could alter truck flows, at least during certain travel periods, is to levy tolls on heavy commercial trucks based on the external risks they generate. Under such a policy, we find that such tolls would be higher-than-average for trucks on Interstate 110, but lower-than-average for trucks on Interstate 710.

More generally, our findings can be used to guide highway-safety policies irrespective of the drayage traffic carried by those highways. By providing three distinct measures of truck related accident risk for each route in our sample, policymakers can determine which of these routes deserves the greatest attention based on their distinct policy objectives.

Thematic Area: Safety and Security

Study of the Exposition Light-Rail's Safety for Pedestrians and Drivers

Najmedin Meshkati, Mansour Rahimi, Jalal Torabzadeh, USC

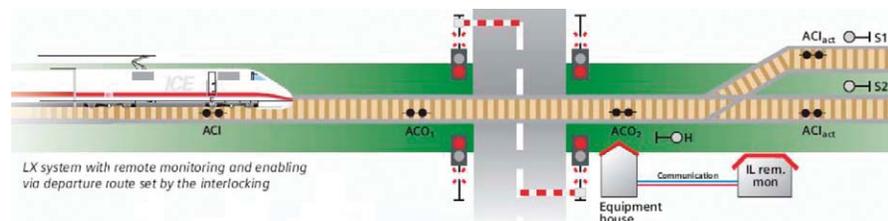
This research project investigates safety-related human factors considerations and their impacts on pedestrians and drivers of the Exposition Light Rail Line (Expo Line). Once completed, the Expo Line will connect downtown Los Angeles to Santa Monica and benefit all of the highly populated areas in between. It will intersect major streets and will call for the establishment of ten stations at specific locations and intersections.

Any major light rail project needs to consider the safety of pedestrians and drivers along its route. The pedestrian and driver safety impact of the Expo Line project is of particular importance due to its impact on sensitive and vulnerable populations such as school children and elderly pedestrians. At-grade rail crossings, as shown by national accident data, pose a high risk for pedestrians and motorists. Human factors and safety considerations in the design of highway-rail crossings play a vital role in reducing those risks significantly. This project analyzes the human factors and safety design criteria for the Western Avenue and Crenshaw Boulevard at-grade intersections along the Expo Line.

Research tasks included field observation and analysis of pedestrian and motorist travel patterns for the above-mentioned intersections. These tasks provided a comprehensive analysis of the underlying design causes for collision conflicts among light rail, drivers and pedestrians.

Automatic Traffic Crossing Operations

It is our final conclusion and recommendation that the ultimate goal, which is to minimize the risk of collisions on the Expo Line, can only be achieved through a proactive approach to eliminate the opportunities for design-induced and other potential errors. As an example



Automatic Traffic Crossing Operations

of a design induced error, we see "confusing, potentially contradictory, messages from the highway-rail signal system," as identified in a fatal grade-crossing accident investigation report by the National Transportation Safety Board in 2003 (NTSB, 2003). Moreover, as lessons from other industries attest, such a systems-oriented integrative approach must also take into account both micro- and macroergonomic considerations in design and operation of light rail tracks, intersections, and other peripheral sub-systems.

Furthermore, we believe that the lessons learned and recommendations presented in this report, should not only be applied to the Exposition Line but also should be considered in the design and operation of any light rail system in the country. The EIR/EIS for Phase II of the Exposition Line, which is supposed to extend the existing Phase I of this light rail to Santa Monica, should also proactively address all human factors safety design considerations, as described throughout this report.

Safety improvements and design considerations can be implemented (with minor modifications) to the specific intersections (Western and Crenshaw) for the Exposition Light Rail project in Los Angeles. As in Europe, it is important to make the passenger and - wherever necessary - the vehicle driver "AWARE" of the implications of Metro Rail and passenger safety. The best approach is to provide a safe environment (by the installing appropriate active and passive warning signs, special pavement, etc.) to encourage and support safe crossing behavior and thinking among passengers, pedestrians, and drivers. An important consideration should be continuous improvement and change as necessary, since people always become accustomed to the existing designs and methods. The Continuous Improvement Process (CIP) should be applied in all design and safety-related issues involving traffic participants who share the same road or intersection.

The following are highly recommended for all intersections along the Expo Line:

- Pedestrian gates and fences should be installed to discourage and prevent accident-causing pedestrian behavior.
- Four quadrant traffic gate systems should be installed to prevent motorists from driving around the gates.
- Visual warnings should be used in conjunction with audible warnings to alert pedestrians and motorists of approaching trains and offer directions to implement safe behavior as described in the MUTCD (detailed in Tables 22 and 23). Intersections analyzed on the Metro Blue Line, that lack sufficient barriers or visual/audible warnings have been shown to have a higher number of pedestrian and motorist incidents and fatalities.

METRANS Faculty

One of METRANS' great strengths is the excellence of its faculty. Affiliated faculty, defined as those who have received research funding from METRANS, number 103. We currently have 54 at USC and 39 at CSULB. These faculty affiliates are drawn from 9 schools and 20 departments, attesting to the multidisciplinary nature of METRANS research. Quality of METRANS faculty is reflected in the awards they receive. In 2009-10, three faculty received awards from national or international organizations and two received university awards. In addition, several have been appointed to top positions in academic and professional committees.

National and International Awards

Petros Ioannou, Professor, Ming Hsieh Department of Electrical Engineering Systems, USC, was honored by the Institution of Engineering and Technology as Fellow and Recipient of the 2009 Heaviside Medal for Achievement in Control.

Martin Krieger, Professor, School of Policy, Planning, and Development, USC, won the American Planning Association's Technology Award for his "Multimedia Boot Camp," a short course in multimedia.

Viktor Prasanna, Professor, Ming Hsieh Department of Electrical Engineering Systems, USC, was named a fellow in the American Academy of Arts and Sciences.

Other Awards

Genevieve Giuliano, METRANS Director, Professor and Associate Dean, School of Policy, Planning, and Development, USC, was awarded a Faculty Appreciation Certificate of Recognition from the Office of International Students.

Forouzan Golshani, Dean, College of Engineering, CSULB, was honored with the Distinguished Dean of Engineering award from the Los Angeles Council of Engineers and Scientists.

Leadership in Professional Associations

Jeet Joshee, Dean, College of Continuing and Professional Education, CSULB, was selected to serve on the Board of Directors of the University Professional and Continuing Education Association for 2010-11. He will also serve a three-year term as commissioner in the association's International Affairs Commission while chairing the Opportunity and Equity Committee.

Kristen Monaco, Professor, Department of Economics, CSULB, was named 2010 Transportation Research Forum Program Vice President.

James Moore, II, Professor, Daniel J. Epstein Department of Industrial Systems Engineering, School of Policy, Planning and Development and Sonny Astani Department of Civil and Environmental Engineering, USC, was elected to serve on the California Transportation Foundation's Board of Directors.

Gary Painter, Professor, School of Policy, Planning, and Development, USC, was elected to the Association of Public Policy and Management's Policy Council.

Promotions & Appointments

Mahyar Amouzegar, Professor, College of Engineering, CSULB, was appointed Director of the Center for Commercial Deployment of Transportation Technologies.

Anastasios Chassiakos, Professor, CSULB was promoted to Director of CSU's California Pre-Doctoral Program.

Randolph Hall, former Vice Provost for Research Advancement at USC, has been elevated to Vice President of Research, reporting to the Provost.

Lisa Schweitzer, School of Policy, Planning and Development, USC was promoted to Associate Professor of Policy, Planning, and Development with tenure.



Randolph Hall



Lisa Schweitzer

Education



SPPD PhD student Yin Wang, right, with SPPD Dean Jack Knott at ASPA Conference Reception.



2010 SPPD PhD students and Eno Fellows Laurie Kaye Nijaki (bottom, third from left) and Mohja Rhoads (top right), with Eno Foundation president, Stephen Van Beek (center).



SPPD Fulbright Scholar
Clara Suh.

The excellence of our students is demonstrated by the many awards they receive each year. Listed below are award recipients for 2009-10.

Fynnwin Prager, USC SPPD PhD student is the 2009-2010 METRANS Student of the Year.

National and International Awards

Sylvia He, USC SPPD PhD student, received the 2010 Dwight David Eisenhower Graduate Fellowship from the Technology Partnership Programs at the U.S. Department of Transportation.

Brendan Keeler, USC SPPC MPL student was awarded a Development Fellowship from the China Academy of Urban Planning and Design.

Clara Suh, USC SPPD undergraduate student, was awarded a Fulbright scholarship and will participate in the English Teaching Assistantship program in South Korea.

Laurie Kaye Nijaki & Mohja Rhoads, USC SPPD PhD students were selected by the Eno Transportation Foundation as 2010 Eno Fellows to attend the 18th Annual Eno Leadership Development Conference in Washington, DC.

Yiming Wang, USC SPPD PhD student, won the Western Regional Science Association's Springer Award for outstanding paper in the field of regional science for Decomposing the Entropy Index of Racial Diversity: In Search of Two Types of Variance. His paper will be published in The Annals of Regional Science.

Yin Wang, USC SPPD PhD graduate (2010), won the ninth annual paper award competition of the American Society for Public Administration's Section on Transportation Policy and Administration for her paper "Determinants of Utilization of Private Finance in Toll Road Development: Evidence from the United States."

USC engineering students **Ryan Berti, Ryan Brown, Tommy Holford, Michael Hsu, Pradyumna Kejriwal, Clarence Li, Farid Nobakht and Denis Tulskiy** took third place at FAA's 2010 Runway Safety/Runway Incursions Challenge.

State Awards

Jezreel Apelar & Clara Suh, USC SPPD undergraduate students and **Chi Man (Mandy) Yeung**, USC Civil Engineering undergraduate student were selected to attend the California Transportation Foundation's Annual Education Symposium in Monterey in November 2009.

Local Awards

Sylvia He & Laurie Kaye Nijaki, USC SPPD PhD students, **Patricia Uzes**, CSULB GLS student, and **Mandy Yeung**, USC SPPD undergraduate, were awarded WTS Transportation Scholarships.

MAGL students **Ebony Loeb, Lauren Roslanowick, Felipe Sinohui, & Mathew Stramer** and GLS students **Fahad Din & Ricardo Ortiz** received scholarships from the Port of Long Beach.

Local Awards, *continued*

GLS students **Samuel Palacios, Alejandro Escobar, David Rodas, Septiadi Tjahjono & Nathan Woodside** received Harbor Transportation Club scholarships.

GLS students **Hector Calderon, Heejung (Heidi) Kim, Jannine Mongeon & Noemi Zepeda** were awarded Los Angeles Transportation Club scholarships.

Brett Everett, CSULB GLS student, was awarded the Mary Bleming Memorial Scholarship.

Daniel Treichler, CSULB GLS student, received a scholarship from Pacific Maritime Association.

University Awards

USC MPL students **Brendan Keeler, Brett MacNaughton, Jeff Sparks & Joe Walcek**, received SPPD 2010 Academic Capstone Student Exhibit Awards. USC MPL students **Clara Suh & Eric Bruins** received honorable mentions.

Joe Walcek also received 2010 MPL Comprehensive Examination Honors for his Transportation and Infrastructure Planning Exam.

Mary Kuhn, USC MPL student received the SPPD Lewis Mumford Prize for the most outstanding essay in Planning History for her work titled "Sustainable Mobility for Women."

CSULB GLS students **Karen Allec, Madeline Bristol, Nadia Chohan, Douglas Elliot, Susan Espana, Sokchanda Im, Stacy Kelso, Greg Matthews, Dan Phillips, Jennifer Recidro, David Rodas, Septiadi Tjahjono, Sven von Borries, Matthew Wilson, Raymond Wisniewski & Nathan Woodside** won awards for Best Capstone Projects for the CSULB GLS Program.

CSULB MAGL students **Mathew Stramer, David Sung, & Christine Tamayo** earned second place in the CSULB Annual Student Research Competition for their paper entitled, "The Impact of Consumer Demand, Market Price of Aviation Fuel and Competition on Load Factors of Air Freight Imports to the United States." They were also honored as outstanding graduate research assistants at the CSULB University Achievement Awards & Research Celebration.

Student Presentations at Conferences

Lingqian Hu, USC SPPD PhD student was selected to present her dissertation research to the New Thinking on Transportation and Society Doctoral Research Series at the Rudin Center for Transportation Policy and Management at New York University and at the ACSP conference in Minneapolis. **Yong-Jin Ahn, Alison Linder & Yiming Wang**, USC SPPD PhD students also presented papers at the ACSP conference.

USC PhD students, **Ahn Yong-Jin, Fynnwin Prager, Mohja Rhoads, Jiangping Zhou & Qunzhi Zhou** and USC Masters students **John Mimms & Zhaohu Fan** were selected to present their research at the 2010 UCTC Conference in Irvine, California.

USC MPL students **Jennifer Blackwell, Michelle Buchmeier, Joy Kwong & Brettany Shannon** were invited to present their project, "Planning for Redevelopment Surrounding the Hauptbahnhof (Central Station) Berlin." at the 2010 National APA Conference in New Orleans, and the 2010 UCTC Conference in Irvine, California.



SPPD MPL student Brendan Keeler, second from right, in China.



GLS graduate, Sokchanda Im, introduced Port of Long Beach Harbor Commissioner Make Walter at the GLS graduation ceremony held at the Port of Long Beach.

METRANS 2010 Student of the Year Fynnwin Prager



Fynnwin Prager, Ph.D student in the USC School of Policy, Planning and Development was named the METRANS Outstanding Student of the Year, in part for his work as a coauthor on three papers on the topic of how quickly ridership returns to transit systems in the wake of attacks. In his nominating letter for Prager, USC Research Professor Adam Rose praised him for his work tackling a tricky subject. "He demonstrated the ability to quickly up the research problem and to apply his knowledge of economics and risk analysis adeptly," wrote Rose. "We would not have been able to deliver an effective paper without him. "This work will be a path-breaking contribution to the literature on transportation resilience, and will also be of great practical use to the Department of Homeland Security Transportation Security Administration."

In Prager's view, policymakers must know about economic damages of terrorist attacks in order to determine what to spend to prevent them – and oftentimes to justify that expense to their constituents. "They have a better sense of how much to spend if they are interested in balancing the net social impact of these events," he said.

"One interesting finding is that service disruptions do matter," Prager said. "So the quicker you can get the service back to normal, the faster passengers will return despite the fear. Government authorities can help on that side of things by influencing supply" of transit. In the wake of the events of Sept. 11, 2001, there was significant interest from policymakers, economists and the media in measuring the economic damage inflicted by the terror attacks. It was not just a matter of being curious or having an interesting factoid on hand.

Prager's career goals are to work in the public policy arena of academia. "I love research, communicating about the research and the teaching and presenting," he said. "And I like the atmosphere and environment that academia provides. "I particularly like the field of public policy because it's a very applied field," Prager added. "You get the satisfaction of being in academia and you are striving toward a truth that can be employed in the often muddy waters of politics and hopefully improve decision-making as a result."

METRANS Education

The Master of Arts in Global Logistics (MAGL) at CSULB is oriented to those with some industry experience. It is a multidisciplinary degree that draws from economics, engineering, information systems, and management. It is aimed at providing a broad foundation in logistics, including supplier relations, electronic commerce, and transportation and inventory management. Nine students completed the program this year, and 16 students are currently enrolled.

The urban planning, public policy, and public administration masters programs in the USC School of Policy, Planning and Development offer a concentration in transportation. Three students took the Urban Planning comprehensive exam in transportation. One hundred fifty one students graduated in these programs. The USC Viterbi School of Engineering offers an MSCE with transportation concentration. Fifty three students graduated with the MSCE this past year.

PhD studies with a concentration in transportation are offered at USC in SPPD and VSOE. PhD graduates for 2009-10 are listed below.

Samim Ghamami, Industrial and Systems Engineering
Dissertation: **Stochastic Models: Simulation and Heavy Traffic Analysis**

Accepted position of Assistant Vice President, Quantitative Financial Analysis, Barclays

Daniel Wright Goldberg, Computer Science
Dissertation: **Spatial Approaches to Reducing Error in Geocoded Data**

Accepted position of Research Assistant Professor of Spatial Science & Associate Director GIS Research Laboratory, College of Letters, Arts & Sciences, USC

Vasiliki Kostami, Business Administration

Dissertation: **Essays on Dynamic Control, Queuing and Pricing**

Accepted position as Assistant Professor of Management Science and Operations at London Business School

Alison Linder,* Policy, Planning and Development

Dissertation: **Linking Participation, Program Design and Outcomes: Voluntary Air Quality programs at the Port of Los Angeles and the Port of Long Beach**

Accepted position of Associate Regional Planner - Goods Movement Southern California Association of Governments

Charles Anthony Radovich, Aerospace Engineering

Dissertation: **Experimental Determination of the Spray Field Produced by a Rolling Tire**

Accepted position of lecturer, USC Department of Aerospace and Mechanical Engineering

Sumit Rangwala, Computer Science

Dissertation: **Congestion Control in Multi-hop Wireless Networks**

Accepted position of Software Engineer (Cloud Computing), Cisco, San Jose, CA

Yin Wang,* Policy, Planning and Development

Dissertation: **Recent Experience in the Utilization of Private Finance for American Toll Road Development**

Accepted a tenure-track appointment as an Assistant Professor of Public Administration Shanghai University of Finance and Economics, Shanghai, China

Jiangping Zhou,* Policy, Planning, and Development

Dissertation: **Congestion Pricing with an Unpriced Temporal Alternative and with Heterogeneous User Groups**

* Dissertation research supported in part by METTRANS research grants

It is often the case that PhD students move to postdoctoral or other temporary positions while completing the dissertation, then move to tenure-track positions. **Lingqian Hu** (Policy, Planning, and Development, 2009) has been appointed Assistant Professor in the Department of Urban Planning, University of Wisconsin-Milwaukee.

New Transportation Professor, Alejandro Toriello

We are pleased to welcome new transportation faculty, Alejandro Toriello, Assistant Professor in the Epstein Department of Industrial and Systems Engineering at USC. He joined USC in the Fall of 2010 after obtaining his Ph.D. in Industrial Engineering at Georgia Tech. His applied research interests are in supply chain management, logistics and transportation, and his theoretical interests are in discrete and dynamic optimization. His thesis studies a time decomposition of supply chain models, with specific applications in maritime transportation and inventory management. Alejandro's academic awards include an NSF Graduate Research Fellowship, a Georgia Tech President's Fellowship, a Roberto Goizueta Foundation Fellowship and an ARCS Foundation Scholarship. Alejandro was born in Guatemala and lived in Atlanta for the past eleven years.



Alejandro Toriello



CSULB MAGL graduates at Commencement.

Professional Development and Executive Education

Continuing education is essential in a rapidly changing work environment. Building upon its signature programs, GLS, GLS Online, and Caltrans Goods Movement Seminars, METRANS continues to strengthen its professional development and executive education programs through CSULB's Center for International Trade and Transportation. This year saw the launch of the Marine Terminal Operations Professional (MTO) Program, a comprehensive professional program that prepares candidates with a wide range of skills essential for efficient terminal operation, and the Global Logistics Specialist Professional Designation Program for international students.

Global Logistics Specialist Professional Designation Program

The Global Logistics Specialist (GLS) program, which started in January 1997, continues to attract classroom (on-ground) and online students. It provides training in all aspects of the supply chain and international trade and is oriented to mid-level industry professionals and public agency staff. We continually evaluate and update both the online and on-ground curriculum to stay current with industry trends.

Since its inception, over 1,100 people have attended classes and over 850 have earned the Global Logistics Specialist designation. In 2009-2010, 132 students (88 on-ground and 44 online) took part in at least one of the six modules, and 56 students (43 on-ground and 13 online) were awarded the Global Logistics professional designation.

The GLS designation is only conferred after successful completion of all six program modules and a capstone project. The capstone project is designed to test the conceptual, analytical, teamwork, and presentation skills the students

have developed throughout the program. Deliverables include a written integrated logistics plan and an oral presentation.

While most of the students in this year's GLS online program are California-based students outside the immediate CSULB service area, we also have students from San Diego, the Pacific Northwest and Illinois. In past years, domestic students have come across the United States from as far as New York and Florida. International students have come from throughout the world, including the Dominican Republic, Canada, Vietnam, Mexico, the Philippines, Romania, India, Nigeria, and Brazil. We recently had inquiries from Turkey and Russia.

In Fall 2009, the U.S. Department of Veteran Affairs approved the GLS program for veterans. These veterans are then eligible for educational benefits under the GI Bill.

Global Logistics Specialist Professional Designation Program for International Students

CITT, in conjunction with California State University, Long Beach's American Language Institute (ALI) now offers the Global Logistics Specialist (GLS) Professional Designation Program for international students. In June 2010, the first two international students, one from Brazil and one from China, completed the program and earned the GLS program designation. The six-month program is designed to provide supply chain/logistics training from a U.S. perspective. Additionally, it offers English language instruction from ALI and/or University courses offered through "Open University." Students also experience various aspects of the U.S. culture.

Caltrans Goods Movement Workshops

Transportation planners are seldom formally trained to deal with the impacts of international trade on our transportation systems. Freight is rarely included in planning and engineering curricula at the college level. But the needs are there.

"Goods Movement and the Supply Chain in 2009: Implications for Caltrans and the Public Sector" was developed by METRANS specifically to help transportation planners learn to apply lessons in goods movement, finance, and planning directly to their jobs. The sixth workshop in this series of 3-day training sessions was held in February 2010 at the Port of Oakland, California. Most participants work for Caltrans while others came from metropolitan planning organizations and state agencies, e.g., the California Air Resources Board. In addition to university professors, instructors included experts from various transportation agencies and industry. The workshop asked participants to look at real-world goods movement problems as part of their class exercises.



Global Logistics Specialist Program Instructors.

Events

2009-10 marked another year of milestones for METRANS and our focus on the organization, sponsorship, and production of significant transportation events. Working together with our fellow UTCs as well as government agencies and industry partners allows METRANS to reach a wider audience for our research findings, education programs, and outreach efforts.

METRANS also continues to develop our relationships with the many other agencies that co-sponsor our programs and provide valuable scholarships and internships for our students. These include the Ports of Los Angeles and Long Beach, the Harbor Transportation Club, the Los Angeles Transportation Club and many others. Now, more than ever, leveraging the relationships with our valuable partners allows METRANS to fulfill its mission of solving transportation problems of large metropolitan regions through interdisciplinary research, education and outreach.

METRANS National Urban Freight Conference

The 3rd METRANS National Urban Freight Conference (NUF) was held October 21-23, 2009 at Hotel Maya in Long Beach, California. Researchers and practitioners from North America, Europe, and Asia examined the impacts of goods movement and international trade in metropolitan areas with a full and diverse array of speakers, panels, and presentations. The purpose of the NUF Conference is to examine the impacts of goods movement and international trade in metropolitan areas. The conference focuses on the urban aspects of goods movement, a major research area for METRANS. It is the only conference devoted to freight issues in metropolitan areas, and it draws participants from throughout the United States and abroad. Participants include academics, industry, and government.

The National Urban Freight Conference was held in conjunction with Freight Research at University Transportation Centers: Integrating Efforts, a one-day conference sponsored by the National Center for Freight, Infrastructure, Research and Education (CFIRE) located at the University of Wisconsin-Madison.

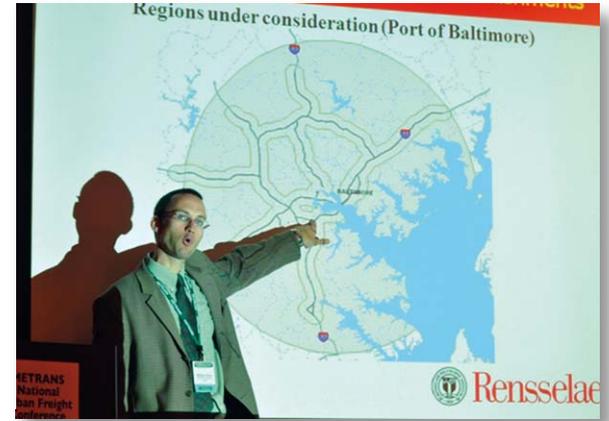
Dr. Eddy Van de Voorde, University of Antwerp, delivered the keynote and spoke of port competition from an international perspective. Prof. Van de Voorde's work covers the international trade spectrum from the maritime sector to air transport.



Patty Senecal, representing the International Warehouse Logistics Association, makes a point at the National Urban Freight Conference held in Long Beach, CA.

His efforts in the areas of economics and policy on behalf of a number of European government institutions and private companies make him uniquely qualified to provide an international perspective on urban freight issues.

The second day's luncheon featured a special session with James Hankla, former President, Board of Harbor Commissioners, Port of Long Beach. In a question and answer type session with Mary Barton, Ph.D., Principal at The Barton Group,



Matthew Brom, from the Rensselaer Polytechnic Institute, poses the question whether ports are to blame for urban congestion at National Urban Freight Conference.

Hankla discussed his career in public service including his role as Executive Director of the Alameda Corridor Transportation Authority and his involvement in port environmental issues.

Presenters and panelists came from all over the United States, Canada, and Europe. Special sessions included two on freight and livability issues and several on our new comparative research collaboration on major ports and regions. Featured were interesting and challenging sessions on environmental issues and mitigation, new modeling and simulation methods, and operational strategies for increasing efficiency of goods movement systems. Detailed event information including a listing of all sessions along with participants' papers and presentations is available at www.metrans.org.

Regional Transportation Workforce Development Summit

METRANS and the Mineta Transportation Institute in partnership with Long Beach City College hosted the California Regional Transportation Workforce Development Summit at Hyatt Regency Long Beach on February 1-2, 2010. The two-day event, titled "Ensuring the Growth of California's Transportation Workforce: Developing the Right Workers for Today's Challenges and Tomorrow's Jobs," was one of a series of summits held around



Peter Appel, Genevieve Giuliano, Rod Diridon and Marianne Venieris at Workforce Development Summit.

the country which will culminate in a national event. There were four major goals for the event: assess the abilities of today's transportation worker and identify the skills necessary for the next generation of California's transportation workforce; bring together professionals from engineering, goods movement, planning, transit, construction, and other fields to identify partners who will address changing workforce needs; showcase programs and partnerships that demonstrate innovation in meeting California's transportation workforce challenge;

and organize the resulting data and recommendations to become part of the National Transportation Workforce Development Summit to be held in Washington, DC.

Over 150 transportation employers and educators from throughout California attended the event. Administrator Peter Appel and Lydia Mercado also attended, representing the U.S. Department of Transportation's Research and Innovative Technology Administration. Key themes emerged frequently in presentations: the future workforce will include more women and immigrants; only innovative education programs will motivate tech-savvy students to learn more about infrastructure, railroads, and other transportation systems; industry and educators must communicate to create relevant curricula; and students need practical job experience in transportation.

Included were 21 showcases featuring projects that respond to transportation workforce development challenges in innovative ways. Participants included educational programs at The California Maritime Academy; College of Alameda; California State University, Long Beach; Mineta Transportation Institute; University of Southern California; California State University, San Bernardino; University of California, Davis; University of California, Irvine; and Long Beach City College. Other participants included SM21 Inc., International Trade Education Program, Port of Long Beach, and the Southern California Regional Transit Training Consortium. Detailed event information including participants' presentations, audio and video interviews, and the complete agenda is available at www.metrans.org.

Research Webinars for Transportation Professionals

METRANS assisted in the development of and participated in the 3-part Caltrans Division of Research & Innovation and California University Transportation Centers webinars for

transportation professionals. Seminar 1, titled "Corridor Management," included a presentation by Cyrus Shahabi, representing USC and METRANS. Seminar 2, titled "Freight & Goods Movement," included Seiji Steimetz and Steven Yamarik representing California State University Long Beach and METRANS. Thomas O'Brien, METRANS Associate Director, served as the moderator for this session and is the METRANS representative on the Webinar series planning team.

Co-sponsored Events

METRANS seeks to leverage resources by joining with other universities and professional organizations to sponsor events.

This year, METRANS co-sponsored a research seminar and two fall conferences featuring transportation issues.

IFAC Symposium

METRANS co-sponsored the 12th International Federation of Automatic Controls (IFAC) Symposium on Control in Transportation Systems held on September 2-4, 2009 in Redondo Beach, California. Spearheaded by METRANS Associate Director of Research Petros Ioannou, the event featured over 120 papers by researchers from all over the world.

TRB International Conference on Women's Issues in Transportation

The campus of University of California, Irvine was the site of the 4th International Conference on Women's Issues in Transportation, held Oct. 27-30, 2009. The conference was sponsored by the Transportation Research Board with METRANS one of the co-sponsors. METRANS Director Genevieve Giuliano and METRANS researcher Lisa Schweitzer made one of the plenary presentations, entitled "Her Money or Her Time."

Carbon Footprints and the Shaping of Public Policy

METRANS joined with the USC based Center for Sustainable Cities in March, 2010 to present METRANS PI Josh Newell's research regarding carbon footprints and the shaping of public policy. Professor Newell is a Research Assistant Professor in the USC School of Policy, Planning, and Development.

UCTC Student Conference Focuses on Sustainable Transportation

The 16th UCTC Student Conference, "Moving Toward Sustainable Transportation," met at the UC Irvine Student Center April 1-2, 2010.

Among the USC presentations, Zhaohu Fan, Mansour Rahimi and Josh Newell discussed "A simulation study of logistics operations at San Pedro Bay Port of Long Beach and Los Angeles"; John Mimms addressed "Driving perception and preparation – How image and transit-motivated design influence the success of transit projects in LA"; Fynnwin Prager and Mohja Rhoads presented "Forecasting the adoption of technology to reduce travel for business-related activities using a systems dynamic model"; and Jiangping Zhou explained his study of "Congestion pricing with an unpriced alternative and with heterogeneous user groups."

USC contributions to poster sessions included: "A proposal for development around Berlin's Central Station" from Jennifer Blackwell, Michelle Buchmeier, Joy Kwong and Brettany Shannon; The "Effect of built environment for public transportation on obesity: A multi-level analysis" by Yong-Jin Ahn; and "Computational process management for transportation system analysis" by Qunzhi Zhou and Viktor K. Prasanna.

Sponsored by the multi-campus University of California Transportation Center (UCTC), keynote speakers included Robert L. Bertini, Deputy Administrator of the Research and Innovative Technology Administration (RITA) of US DOT; Scott Samuelsen, Professor of Mechanical, Aerospace and Environmental Engineering at UCI; and James Pinheiro, CalTrans District 12 Deputy Director of Operations and Maintenance. The conference included more than 30 student presentations and 60 poster sessions, as well as six faculty presentations. Abstracts are available on the conference website (<http://uctc2010.its.uci.edu>).

Research Seminars

METRANS holds a seminar series that features METRANS sponsored research and guest seminars. It provides a venue for sharing new research with faculty, students and local industry and agencies. Seminars are typically held via teleconference. Seminars are open to the public and are advertised to local public agencies and industry.

The following seminars were offered over the past year.

Eyes on Bourne Everywhere: Using "Urban Tomography" for Security at a Los Angeles Transportation Hub, September, 2009

Martin Krieger, Professor, School of Policy, Planning, and Development, USC



Martin Krieger

Beyond Polycentricity and Dispersion: The Accessibility City, Changes in Population Location, Barcelona 1991-2006, November, 2009

Miquel-Àngel Garcia-López, Visiting Scholar, Department of Applied Economics Universitat Autònoma de Barcelona

Integrated Modeling and Simulation of Transportation Systems, December, 2009

Viktor K. Prasanna, Professor, Ming Hsieh Department of Electrical Engineering, USC

Estimating Behavioral Changes for Transportation Modes after Terrorist Attacks in London, Madrid, and Tokyo, February, 2010

Fynnwin Prager, Doctoral Student, School of Policy, Planning, and Development, USC

The State of Public Transportation, February, 2010

William Millar, President of the American Public Transportation Association (APTA)

Retrofitting the Suburbs to Increase Walking: Evidence from a Land Use – Travel Study, March, 2010

Marlon Boarnet, Professor of Planning, Policy, and Design and Economics, University of California, Irvine

Carbon Footprints and the Shaping of Public Policy, March 11, 2010

Joint seminar with Center for Sustainable Cities
Josh Newell, Research Assistant Professor
USC School of Policy, Planning, and Development

Guest Lecturers Join the METRANS Research Seminars

The METRANS spring seminar series brought both a practitioner and a visiting scholar to campus.

In February, American Public Transportation Association (APTA) President William Millar discussed "The State of Public Transportation." He covered issues ranging from different modes of public transit and high-speed rail to the economic, environmental and energy-independence arguments for increased investment in public transportation. Under Millar since 1996, APTA has successfully pursued dramatically increased federal investment in public transportation and led the establishment of the Transit Cooperative Research Program. He is a longtime member (and past chair) of the Transportation Research Board and serves on advisory committees for several university transportation research institutes.



William Millar

In March, Marlon Boarnet, Professor of Planning, Policy, and Design and Economics at UC Irvine, presented the METRANS Research Seminar "Retrofitting the Suburbs to Increase Walking: Evidence from a Land Use-Travel Study." Boarnet reported the results from a detailed travel diary survey of 2,125 residents in the South Bay area of Los Angeles County, which found substantial variations in the amount of walking trips between compact development centers and linear corridors. While centers were more likely to attract walking trips because of the concentration of local shopping and service destinations in a commercial core, successful business concentration required a larger pedestrian customer base than could be supplied by the immediate neighborhood, and thus required two to three times as many additional customers to arrive by car or bus from the surrounding area.



Marlon Boarnet

One of the most widely published planning scholars, Boarnet studies land use-travel behavior interactions, urban growth patterns, the economic impacts of transportation infrastructure, and economic development. He edits the *Journal of Regional Science*. He was a member of the National Academy of Sciences / National Research Council Committee on "Relationships among Development Patterns, Vehicle Miles Traveled, and Energy Consumption," which authored the recent report "Driving and the Built Environment."

Communications

METRANS News

METRANS News is the official newsletter for the METRANS Transportation Center. The eight-page newsletter features METRANS researchers, conferences and other events, recent publications, interviews with key individuals involved with METRANS, and other newsworthy activities and events. Of the 1,000 copies that are printed, around 400 are distributed to the METRANS Advisory Board, Executive Committee, researchers and universities, public agency managers, and elected officials. The newsletter is also posted on the METRANS website and available for download. Over 500 members of the national research community, federal, state and local leaders, industry leaders, and federal, state and local transportation agencies are part of our growing database of interest, and receive an electronic announcement when a new issue is posted. Issues are also distributed at conferences, events, and meetings. As of June 2010, 19 issues have been published. Issues were published in August 2009 and May 2010.



Building Bridges

Building Bridges is a four-page newsletter produced for METRANS by California State University's Center for International Trade and Transportation. It serves as a briefing document to inform and promote dialogue within the maritime and logistics industry communities and to promote METRANS events. Of the 1,750 copies of each issue that are printed, approximately 1,200 are distributed to ILWU local members, industry leaders, and government agencies. Issues are also distributed at conferences, events, and meetings. All issues are posted and available for download on the METRANS website. As of June 2010, 33 issues have been published. Issues were published in November 2009, February 2010, and May 2010.



Podcasts

Transcasts

TransCasts are the METRANS Transportation Center's podcasts, and feature interviews with METRANS researchers and other distinguished transportation experts. They spotlight education programs at USC and CSULB and further explore issues that are showcased in METRANS outreach programs.

2009 – 2010 Transcasts

Michael Onder, FHWA

Host Mat Kaplan sat down with Mike Onder at the METRANS National Urban Freight Conference late last October for an in-depth conversation about transportation issues.

Dr. Kristen Monaco, California State University, Long Beach

Dr. Monaco discusses her research on a variety of trucking and transportation issues, including how drayage might be made more productive, responsive, and more green.

Dr. Eddy Van de Voorde, University of Antwerp METRANS National Urban Freight Conference Keynote speaker Eddy Van de Voorde on transportation issues from an international perspective.

ContainerCasts

ContainerCasts are podcasts exploring important issues in goods movement and international trade. They feature METRANS activities, including research findings, and interviews with key decision makers from the trade and transportation arena. Several of the 2009-2010 ContainerCasts follow.

Competitive Visioning

How do we reach consensus on the future of goods movement and how might we solve the trade-related challenges?

Legacy of Containerization

The legacy of containerization and the potential for a new revolution in US trade as a result of changes in the way the industry handles chassis.

Getting Ready For the Recovery

What happens to international trade after an economic recovery? Will more consumer confidence mean the return of 2006-level trade volumes to our local ports? Much of that depends on what happens in Asia and China.

Clean Trucks in the Ports

How do we clean up the trucks serving the ports of Long Beach and Los Angeles with the minimum in policy changes and damage to trade?

"I'm Just A Bill..."

The impact of the California budget crisis and the reauthorization of the federal surface transportation bill on trade-related infrastructure projects, including the complex nature of transportation policy making and financing in the U.S. and the numerous agencies involved.

Website

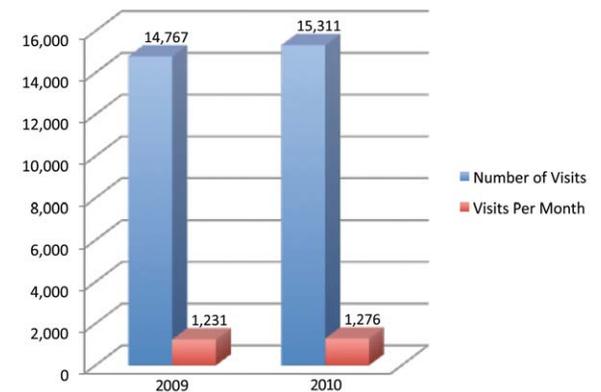
The METRANS website is the primary means of dissemination of information on METRANS activities. The METRANS Strategic Plan, Annual Reports, and Semi-Annual Reports are available in downloadable form. All research project final reports, conference summaries, and technology transfer reports are also available. The *Building Bridges* newsletter and *METRANS*

News are also available. The website also provides links to USC and CSULB transportation-related educational programs, identifies educational programs in transportation and links to 120 sources of transportation information. The UTC search engine locates documents on all other UTC websites by keyword.

With the rapid growth of the internet as a primary source of information, website communications are increasingly important.

We continue to experiment with various media and technologies to enhance the utility and attractiveness of the website. In addition to providing all the information required of UTCs, METRANS offers additional services, and provides links to other relevant web pages.

METRANS website statistics continue to show an impressive level of website traffic, with an increase in visits of 3% over the prior year, as shown in the chart below. Visitors represent numerous countries; and the largest percentage goes directly to the site, i.e. they are not referred from another Internet location.



James Moore Elected to CTF Board of Directors



METRANS Executive Committee Member James E. Moore, II has been elected to a three year term on the California Transportation Foundation (CTF) Board of the Directors. Moore is a Professor in the Epstein Department of Industrial and Systems Engineering, the Sony Astani Department of Civil and Environmental Engineering, and the School of Policy, Planning, and Development. He also serves as faculty director of the Astani Department's transportation engineering program.

Transportation students have benefited from the Foundation's educational activities for several years. The Foundation's annual Transportation Education Symposium brings together highest-level transportation professionals from California agencies and firms with the best and brightest transportation students from universities across the State to participate in a unique, team-based competition in which students formulate a professional response to a mock request for proposals relating to a transportation engineering project. Juniors and seniors in civil engineering and urban planning are eligible to participate, subject to nomination by their respective institutions. METRANS faculty select three students to attend the symposium each year, several of whom have participated on winning teams and/or received CTF scholarships. Student participants consistently report the symposium is an extraordinary experience at which they gain professional direction they will use throughout their careers. This year, METRANS sent USC SPPD students Jezreel Apelar and Clara Suh, and USC engineering student Mandy Yeung. Yeung writes, "It was truly an amazing event where I got to work with not only some of the smartest transportation-minded students in California, but also senior professionals in the field... Normally it would take years of work experience before I get a chance to work with this group of professionals, but thanks to CTF I got to mingle, network, and learn from this group of senior management on a very interesting RFP project. I had a lot of fun and learned so much."

Moore is the first academic to serve on the CTF Board; and, in fact, the first ever nominated to do so. "This is a substantial vote of confidence in USC's relationship with the transportation engineering and planning professions," reports Moore. "Being invited into this role ahead of personnel from California's other leading transportation research and teaching universities indicates USC has a reputation as an institution that actively cultivates its understanding of the professions and industries our students enter."

Management Structure

University of Southern California holds the prime grants that fund METRANS from the US DOT and Caltrans. Center administration is the responsibility of the USC Principal Investigator, but all policy matters are jointly decided by USC and CSULB through the METRANS Executive Committee. A full-time staff member serves as METRANS Administrator. Staffing for CSULB activities is allocated on a task specific basis.

Executive Committee

The Executive Committee is responsible for all METRANS project selections and for setting METRANS policies. Executive Committee membership is a voluntary service activity. The level of leadership, expertise and dedication of the METRANS Executive Committee is exemplary. Not only are these faculty leaders in their respective fields of research, each has significant administrative responsibilities at their respective universities. Current membership is:

Mahyar Amouzegar, Professor, Director of the Center for the Commercial Deployment of Transportation Technologies (CCDoTT), Associate Dean for Research and Graduate Studies, College of Engineering, CSULB

Anastasios Chassiakos, Professor of Electrical Engineering, Computer Engineering and Computer Science, College of Engineering, CSULB

Maged Dessouky, Professor of Industrial & Systems Engineering, Daniel J. Epstein Department of Industrial and Systems Engineering, Viterbi School of Engineering, USC

Genevieve Giuliano, Professor, Senior Associate Dean of Research and Technology, and Margaret and John Ferraro Chair in Effective Local Government, School of Policy, Planning, and Development, USC

Petros Ioannou, Professor of Electrical Engineering Systems, Director of Center for Advanced Transportation Technologies, Viterbi School of Engineering, USC

Joe Magaddino, Professor of Economics and Chair, Department of Economics, CSULB

Executive Committee, continued

James E. Moore II, Professor of Industrial and Systems Engineering, Daniel J. Epstein Department of Industrial and Systems Engineering, Professor of Civil and Environmental Engineering, Sonny Astani Department of Civil Engineering, Professor of Public Policy and Management, School of Policy, Planning, and Development, Chair, Daniel J. Epstein Department of Industrial and Systems Engineering and Director, Transportation Engineering Program, Viterbi School of Engineering, USC

Marianne Venieris, Executive Director, Center for International Trade and Transportation, CSULB

Director

Genevieve Giuliano, Professor and Senior Associate Dean of Research and Technology, and Margaret and John Ferraro Chair in Effective Local Government, School of Policy, Planning, and Development is Director of METRANS. The Director is responsible for the overall management of METRANS, including reporting, matching fund solicitation, outreach, publications, education, supervision of the METRANS Administrator and other staff, project management and development of the center research agenda, and requests for proposals/qualifications. The center director is responsible for chairing meetings of the Executive and the Advisory Committee.

Deputy Director

Marianne Venieris serves as METRANS Deputy Director. Ms. Venieris has been responsible for the CSULB technology transfer activities since METRANS' inception. She is an experienced manager and the leading force behind METRANS' goods movement outreach activities. Ms. Venieris is Executive Director of CITT. The Deputy Director is responsible for collecting performance statistics related to CSULB activities, distributing information to CSULB faculty and students and overseeing the METRANS technology transfer program. The Deputy Director works under the direction of the Executive Director.

Associate Director of Research

Petros Ioannou serves as METRANS Associate Director of Research. He is responsible for the Los Angeles test bed research effort and the research proposal review process. The Associate Director of Research works under the direction of the METRANS Director.

Associate Director of METRANS-CSULB Programs

Thomas O'Brien Director of Research, Center for International Trade and Transportation, CSULB, is the Associate Director of METRANS-CSULB Programs. This position is responsible for managing METRANS research activities at CSULB, communications and outreach. The Director of Research is also involved in the development and implementation of professional training programs coordinated through CSULB.

Center Administrator

METRANS administrative tasks are divided between two positions. The METRANS Administrator, **Victoria Valentine**, is responsible for all Center administration except budgeting and accounting. The METRANS Account Coordinator, **Elizabeth Gatchalian**, handles all budgeting and account responsibilities. The Account Coordinator is part of the SPPD Business Office and reports to the SPPD Business Office Manager. Ms. Valentine is assisted by a part-time student assistant who serves as liaison for all student-related activities and coordinates the METRANS Seminar Series.

CSULB Administrator

Alix Traver serves as CSULB Project Coordinator. The position is responsible for the collection of performance data at CSULB, and for communicating METRANS information to CSULB faculty, staff, and students. The position is also responsible for assisting with the METRANS Annual Conference, with the publication of METRANS News, and for developing center promotions. The CSULB Project Coordinator works under the guidance of the Deputy Director and the Center Administrator.

Webmaster

The website is hosted by Urban Insight. Our administrative staff has capability to update the website, making changes and updates in an efficient and timely manner.



Marianne Venieris



Thomas O'Brien

Advisory Board

The Director has formed an Advisory Board composed of representatives from agencies and companies that participate in center activities. The Advisory Board is used to solicit suggestions for research, to assist in student job placements, and to assist in outreach and technology transfer activities. The Advisory Board meets annually.

METRANS Advisory Board

Name	Title	Organization
Doug Beal (Emeritus Member)	Principal	Transportation Policy Consulting
Doug Failing	Executive Director, Highway Programs	Los Angeles County Metropolitan Transportation Authority
Stephen Finnegan	Manager, Government Affairs and Public Policy	Automobile Club of Southern California and AAA Hawaii
Michael Flanigon	Director, Office of Technology	Federal Transit Administration
Anthony Furst	Director, Freight Management and Operations	FHWA
Fran Inman	Senior Vice President	Majestic Realty Co.
Hasan Ikhata	Executive Director	Southern California Association of Governments
Randell Iwasaki	Executive Director	Contra Costa Transportation Authority
Gloria Jeff	Associate Director, Transportation Operations Administration	District Department of Transportation
Geraldine Knatz	Executive Director	Port of Los Angeles
Stephen Lantz	Director of Communications and Development	Metrolink (Southern California Regional Rail Authority)
Arthur Leahy	Chief Executive Officer	Los Angeles County Metropolitan Transportation Authority
Jack Levis	Director of Process Management	United Parcel Service
Domenick Miretti	Senior Port Liaison	International Longshore and Warehouse Union
Mark Pisano	Senior fellow, School of Policy, Planning and Development	University of Southern California
Richard Powers	Executive Director	Gateway Cities Council of Governments
Cindy Quon	Director, District 12	Caltrans
Barry Wallerstein	Executive Officer	South Coast Air Quality Management District

Burkhard Englert
Decrypting the Harbor
Transportation Network



For years, Burkhard Englert has been applying his mathematical tools to distributed networks. Sometimes those networks are comprised of computer servers. Sometimes they are delivery trucks.

“The tools are basically the same,” he says. “Once you find a problem, the way you solve it is by abstracting away the things that are unimportant. Once you do that, you end up with graphs and networks to analyze the same way, whether it’s a transportation system or a distributed network of computers.”

Englert is a professor in the Department of Computer Engineering and Computer Science at California State University Long Beach. He came to the United States after earning a BS degree in mathematics from the University of Tübingen in Germany (1992). To earn his PhD in the department of Mathematics at the University of Connecticut in 2000, he researched computability theory (also called recursion theory, which deals with unsolvable problems) and distributed algorithms. He then did

post-doctoral work at UCLA and earned the Robert Sorgenfrey Distinguished Teaching Award for visiting faculty.

For METRANS, Englert is on his third project. This project, “The Impact of Truck Repositioning on Congestion and Pollution in the LA Basin,” takes a leap beyond the math. Transportation models and simulations of pollution and congestion caused by port-related traffic typically focus on trucks going to and from LA/LB port terminals to delivery and pickup points. Empty repositioning routes are generally discarded in the overall analysis, even if owner operators are taking their vehicles home at night. But do all drivers live close to the ports? And would they be inclined to move if future transportation patterns change – such as the development of inland ports elsewhere in the region?

Although Englert’s first two METRANS studies focused on data and technology issues, this interest in driver conditions came about because of another study about optimizing the transportation network in the LA region. “We were considering inland ports, but we realized we didn’t have any information about what happens to the trucks when they are not being used to either pick up or drop off a container. Nobody has data about that, he explains.

METRANS Affiliated Research Faculty

METRANS has funded a total of 112 faculty at USC and CSULB, 104 of which are faculty affiliates of the METRANS Center (the remaining 8 are no longer at USC or CSULB, due to retirement or move). This number includes faculty who have received funds either through the regular research program or the applied research program. Keeping to the METRANS interdisciplinary theme, faculty are drawn from four branches of engineering (civil, electrical, industrial, and mechanical), computer science, as well as the social sciences, business, health sciences, public policy, planning, and public administration. These faculty serve as principal investigators on METRANS-funded projects, and have responsibility for overseeing individual research projects.

California State University, Long Beach

Tracy Bradley Maples	Christine Jocoy	Thomas O’Brien	Fei Wang
Chin Chang	Tim Jordanides	Emily Parentela	Suzanne Wechsler
Anastasios Chassiakos	I-Hung Khoo	Cheryl Pruitt	Xiaolong Wu
Robert Chi	Melody Kiang	Hamid Rahai	Steven Yamarik
Burkhard Englert	Shui Lam	Grace Reynolds	Guy Yamashiro
Mohammed Forouzes	Christopher Lee	Shadi Saadeh	Henry Yeh
Robert Friis	Bei Lu	Antonella Sciortino	Hsien-Yang Yeh
Darin Goldstein	Joseph Magaddino	Tariq Shehab-Eldeen	
Lisa Grobar	Wade Martin	Seiji Steimetz	
Min He	Kristen Monaco	Reza Toossi	
Kenneth James	Tang-Hung Nguyen	Jalal Torabzadeh	

University of Southern California

Garrett Asay	John Heidemann	Josh Newell	Cyrus Shahabi
Amol Bakshi	Petros Ioannou	Fernando Ordenez	Constantinos Sioutas
Tridib Banerjee	Erik Johnson	Gary Painter	David Sloane
Jean-Pierre Bardet	Behrokh Khoshnevis	Kurt Palmer	Millind Tambe
Burcin Becerik-Gerber	Sven Koenig	Qisheng Pan	Maria Todorovska
Hanh Dam Le-Griffin	Ilias Kosmatapoulos	Alice Parker	Mihailo D. Trifunak
Maged Dessouky	Martin Krieger	Andrea Polidori	Theodore Tsotsis
Michael Driver	Bhaskar Krishnamarchari	Viktor Prasanna	Chris Williamson
Fokion Egolfopoulos	John Kuprenas	Konstantinos Psounis	Hung Leung Wong
Roger Ghanem	Bumsoo Lee	Mansour Rahimi	Maria Yang
Genevieve Giuliano	LaVonna Lewis	Christian Redfearn	Suya You
Peter Gordon	Sami Masri	Harry Richardson	
Ramesh Govindan	Najmedin Meshkati	Paul Ronney	
Martin Gundersen	James Elliott Moore II	Sheldon Ross	
Randolph Hall	Dowell Myers	Lisa Schweitzer	
Hossein Hashemi	Ulrich Neumann	Jefferey Sellers	

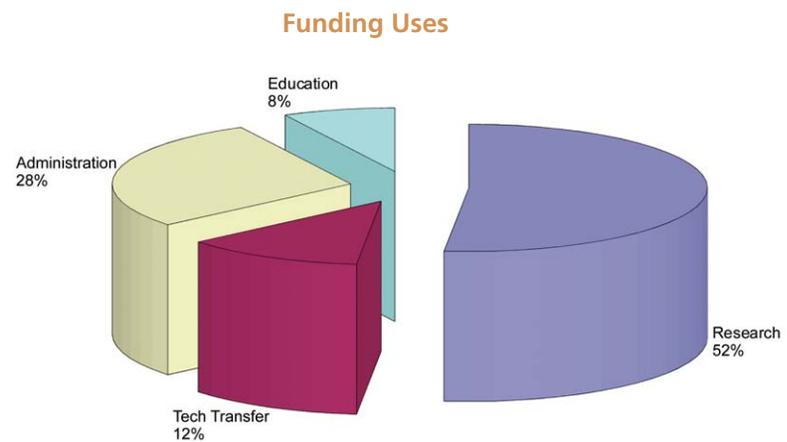
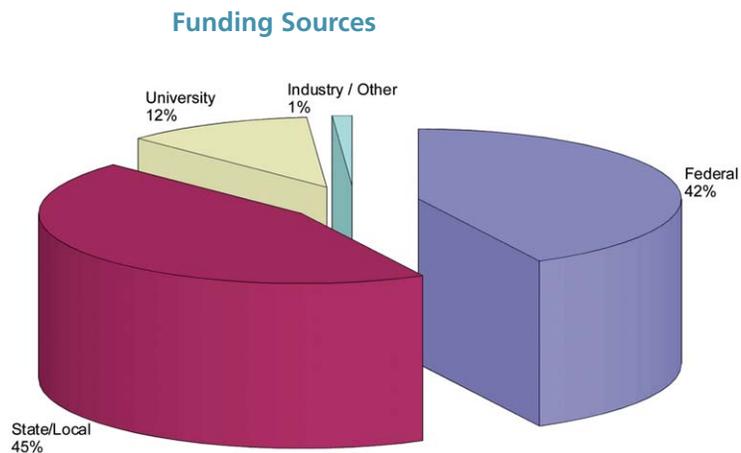
Finances

Funding Sources

METRANS received a total of \$2,802,315 from all sources; the USDOT share accounts for 42 percent. The largest share continues to come from state and local sources: the full dollar-for-dollar match from the California Department of Transportation, plus additional contributions from state and local agencies. University matching funds account for 12 percent, with the remainder from private industry and other sources. The ratio of match to USDOT funding for 2009-10 is \$1.36, compared to \$1.33 in 2008-09.

Funding Uses

The chart below is based on allocated budget expenditures and includes budgeting of surplus funds from previous years. The total is about \$1.8 million. This year research accounts for 52% of the allocated budget. Education accounts for a small proportion of funds, because as METRANS does not have a scholarship program; students are supported on research grants. Roughly ¼ of the research budget of a typical project is for student support, not including tuition contributions.





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