

**UCLA EXTENSION PUBLIC POLICY PROGRAM
Annual Symposium Series on
THE TRANSPORTATION, LAND USE, ENVIRONMENT CONNECTION**

Redefining, Reevaluating & Reinventing Transit

**October 14-16, 2001
UCLA Conference Center
Lake Arrowhead, California**

SUMMARY OF PROCEEDINGS

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FOREWORD

This report is a summary of proceedings from a policy and research symposium convened by the UCLA Extension Public Policy Program in October 2001. The topic of this symposium was transit – its promise, problems, and prospects for the future.

The symposium was the eleventh in an annual series convened to address the important connections between transportation, land use, and environmental quality. Each year a special theme is selected for detailed examination relating to the interrelationships among these three areas. This year's topic was not intended to be just another industry discussion about transit, but rather one that looked at the issue in unique ways. Specifically, it focused on cost and benefit issues, and approaches to redefining and reinventing transit to work more efficiently, effectively, and equitably in our cities and regions.

Past programs in the Arrowhead Symposium series have focused on assessing the relative effectiveness and feasibility of different strategies for improving transportation congestion, urban form and environmental quality. Topics have included: pricing and market-based strategies; travel demand management; changes to land use policies and practices; and application of advanced transportation technologies. In recent years, we turned to examining the topics of economic linkages; finance issues; implications of growth on interregional transportation needs, and last year, demographic and economic growth on implications for linkages between transportation, land use and the environment.

To ensure that the information and issues addressed in these programs are keyed to the needs of policy makers and practitioners, each annual symposium is developed with numerous representatives of the co-sponsoring and cooperating agencies and organizations involved with this series, which include governmental, business, environmental, and public interest groups. These organizations are identified in Appendix D of this report.

I'd like to acknowledge the special partnership that UCLA Extension has shared with UCLA's School of Public Policy and Social Research in developing this symposium each year, including the invaluable contributions of my co-coordinator, Professor Brian Taylor in the School's Urban Planning Department. Special thanks also, to Hiroyuki Iseki and Allison Yoh, who prepared this comprehensive report. They are affiliated with UCLA's Institute of Transportation Studies and Ph.D. students in the Urban Planning Department.

It is the hope of the symposium organizers that information and ideas that emerged from this symposium will contribute to ongoing policy dialogues, and inspire applications to daily operations, political decisions, planning practices, and research agendas in order to thoughtfully redefine, reevaluate, and reinvent transit.

Joanne Freilich, Director
UCLA Extension Public Policy Program

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I. INTRODUCTION

For the past decade, the UCLA Extension Public Policy Program, in conjunction with the UCLA School of Public Policy and Social Research, has assembled policymakers, planning practitioners, researchers, academics, and various interest groups at the annual Transportation, Land Use and Environment Connection Symposium. Participants spend three days at the UCLA Conference Center at Lake Arrowhead in sessions discussing various issues facing transportation, land use, and environmental policymaking. This year's symposium focused on transit, which is very timely, given the increasing public investment in public transit systems, and the increasing importance of transit in providing mobility for people in urban, suburban, and even rural areas.

Public transit systems in the U.S. have made tremendous strides over the past three decades in increasing the quality of services to the traveling public, improving industry planning practices, and extending the supply of transit services. These efforts have contributed to the success of the late 1990s, when ridership increased nationally. But despite this increase in ridership, transit's market (or mode) share of metropolitan travel has continued to erode, requiring large subsidies for both operating and capital costs. While such subsidies are arguably justified because transit provides an essential social service, decision-makers, practitioners, advocates, and planners today also have very high expectations about what these subsidies can achieve in solving a wide range of other pressing problems; these other objectives include reducing congestion, improving environmental conditions, controlling rapid suburban development, preserving natural habitats and open spaces, and reducing poverty. Specifically, transit is expected to attract choice riders as a way to reduce congestion and improve air and water quality, to provide accessibility for transit dependents, and to induce economic development around transit stations/stops and along transit corridors.

These objectives sometimes conflict with each other: for example, pursuing high quality services and extended networks to attract choice riders often results in uneven subsidies between discretionary users and dependent users. Other conditions also require the transit industry to play significant roles in the public realm. The explosion of immigration, especially in California, means that many new immigrants cannot afford to buy a car, and many other people cannot regularly make use of automobiles due to low income, age, disability, or other reasons. As such, public transit is an indispensable social service that provides accessibility to jobs, job training, childcare, medical services, recreational activities, and household serving trips.

Transit also is often expected to help induce economic development around transit stations and stops, and along transit corridors. High-density urban forms and land uses are undoubtedly complementary to transit use, but local governments often are concerned with many factors other than promoting transit use. Improving the coordination between new development and transit remains a challenge to the industry, and to economic interests alike.

Given the many, and sometimes contradictory expectations for transit, the symposium explored what we can reasonably expect from transit, and how transit can be redefined, reevaluated, and reinvented for the 21st century. We have much to learn about the best ways for transit to achieve these goals.

Discussions and presentations covered many issues of transit innovation, such as technology, policy, governance, distribution, and pricing. One issue was clear and received wide consensus – that transportation needs are changing and agencies must adapt their services to meet growing needs. While many participants disagreed about the ability of transit to meet various global, national, and local objectives, most agreed that agencies must focus on the attractiveness of

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transit to individual riders. Some participants discussed their research and marketing efforts to find niche markets and to properly price transit, while others focused on the importance of making transit easy and simple to use. Most agreed that measuring outcomes such as ridership, mobility, congestion reduction, and social and environmental benefits were the most appropriate ways to re-evaluate transit.

Participants looked at different methods and ideas for reinventing transit: some looked to other countries for new ideas and examples. Here in the U.S., transit has a very different role than in other parts of the world. Collectively, transportation policies in the U.S. encourage travel by private automobile, and in such an environment, transit systems face difficulty in competing against private automobiles that offer high levels of mobility, faster door-to-door travel speeds, more flexibility, more convenience, and greater security – all at relatively low costs to the user. Can policies used in other transit-oriented countries be applied to the United States to encourage greater transit use here?

While some participants looked to the past to evaluate transit's role in development, land use, urban forms, and mobility, others looked to new technologies to reinvent transit. Emerging information technologies and new demand-responsive services are different from conventional fixed-route transit service, and can compete better with cars. Some participants also saw new transit technology as a way to reduce air and water pollution, and others tried to assess whether clean fuel technology was enough to achieve environmental objectives. Still others highlighted new types of public-private and institutional partnerships that offer opportunities to tap into new transit markets that were not recognized in the past.

These proceedings summarize the valuable information that grew out of the symposium held during October 14-16, 2001. Each of the twelve sessions is summarized, with a description of the presentations, followed by the discussion among all participants. We have presented as much information as possible without editorial comment or alteration. We hope that these proceedings will assist participants in recalling the contents and substantive issues of the presentations and discussions. For those who did not attend the symposium, this document provides enough detail to serve as a stand-alone record of the program in its entirety.

Hiroyuki Iseki
Allison Yoh

II. SYMPOSIUM PROCEEDINGS

Joanne Freilich, Director, UCLA Extension Public Policy Program, welcomed all participants to the annual Transportation, Land Use and Environment Connection symposium. She thanked participants for traveling from all parts of the nation to Lake Arrowhead, especially in light of the unsettling times for our country and the world. This symposium, in its 11th year, addresses the connections between transportation, land use, and the environment. In previous years, the symposium has focused on the role of pricing and market-based incentives in addressing transportation, land use, and air quality issues; and the role of new transportation and air quality technologies such as smart highways and alternative fuels. Two years ago, the symposium addressed interregional passenger travel and goods movement between metropolitan areas. Last year, because of the major population and economic growth projected for the coming decades, the symposium explored growth and quality of life issues in the context of transportation, land use and the environment.

This year, the steering committee selected transit as the topic, questioning whether transit can be made more viable, and how it should be redefined and even reinvented for the 21st century. This symposium specifically looks at how the complicated industry of transit fits within a larger context of transportation, land use and the environment. And reflecting this aim is the large number of people from the transit industry as well as from other policy and planning realms.

The symposium is unique in that it brings together policymakers, planning practitioners, and members of the research and academic communities for a sustained, interactive dialogue about issues. The goal is, in the end, to produce a better understanding about these issues we face as a profession. Each session, therefore, includes a discussion period in which all participants are encouraged to offer responses, questions, comments, and share new ideas.

Freilich thanked her co-coordinators of this program: **Brian Taylor**, Associate Professor of Urban Planning and Director of the Institute of Transportation Studies at UCLA; and **LeRoy Graymer**, the Founding Director of the UCLA Extension Public Policy Program.

SESSION 1: REINVENTING TRANSIT: INTRODUCTION AND SYMPOSIUM OVERVIEW

Brian Taylor, Director, UCLA Institute of Transportation Studies and Associate Professor of Urban Planning

Brian Taylor explained the symposium's objectives. Unique among other conferences dealing with transit, this symposium incorporates dialogue and discussion from all communities – business, research, operations, management, government, and advocacy – that deal with transportation, land use and the environment.

The expectations that policymakers, practitioners and researchers have put on transit have been heroic. In terms of land use, transit is assumed to encourage more orderly and compact growth, especially acting as a magnet for pedestrian-oriented developments. Environmentalists also expect transit to reduce the consumption of non-renewable resources, help protect and maintain open space, and reduce air pollutants. And at the same time, while transit is expected to attract people out of their cars, it is also expected to provide lifeline services for those who have no other options for travel.

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Given two important countervailing trends – waxing public financial support and waning transit market shares – how able is transit and how reasonable is it for us to expect transit to meet all of these expectations? This symposium will explore some of these issues, in the context of how transit can be redefined, reevaluated, and reinvented. In this context, speakers will ask:

Redefining transit: What should and can the industry expect transit to accomplish? Should transit be able to reduce dependence on cars? Does it reduce congestion? Or is transit a lifeline for those who have no other means of travel? How well does transit act as a social service? Does it keep people out of their cars, or serve the needs of the poor, elderly, and disabled? What are transit's objectives?

Reinventing transit: What is reasonable to expect from transit? How are needs changing among various population groups, and how is transit changing to meet those needs? What are the costs and who pays for them? What are the core markets and how are demands changing? Where are there new markets and what are some pricing innovations? How can we reinvent transit to meet a changing world? How can we make transit more like autos, if we choose to create auto-oriented environments? What are the limits to technology? What are promising new options?

Reevaluating transit: How is it deployed, utilized, subsidized, and evaluated? Does urban form dictate transit, or can transit reshape our urban landscapes? How can local and regional governments work to increase the transportation-land use connections? Can technology make transit greener? What can we learn from other countries, both developing and developed?

These are only a sample of the various questions that this symposium and its speakers will discuss.

SESSION 2: LOOKING BACK, LOOKING AHEAD: THE CHALLENGES TO TRANSIT'S RENEWAL

Brian Taylor (Moderator), Associate Professor of Urban Planning and Director, Institute of Transportation Studies, UCLA School of Public Policy and Social Research

Celia Kupersmith, First Vice Chair, American Public Transportation Association (APTA) and General Manager and CEO, Golden Gate Bridge, Highway and Transportation District

David W. Jones, Jr., Transportation Consultant, San Geronimo, CA

Celia Kupersmith began with a brief description of APTA, the American Public Transportation Association. APTA is a private non-profit trade association serving the needs and interests of the public transportation industry in North America. APTA represents public transportation systems carrying more than 90 percent of public transportation riders in the US and Canada, including buses, rail cars, commuter trains, and paratransit vehicles. APTA's message is that public transportation can and does make a difference in the overall quality of life, and is a key to sustainable economic growth. APTA recognizes that America needs great public transportation just as it needs great roads and highways.

Kupersmith then gave an overview of the state of the industry. Why do the federal, state, and local governments invest in public transportation? Because funding for public transportation pays big dividends for America's communities, the net return on the taxpayer's investments is as high as six to one.

Kupersmith argued, for example, that by improving access, transit investment improves local property values by as much as 25 percent. And for every \$10 million invested in capital projects for public transportation, more than 300 jobs are created, and businesses gain \$30 million in sales.

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Public transportation also reduces congestion costs. For \$10 million invested in transit, more than \$15 million is saved in transportation costs to both highway and transit users. And public transportation is a key force in moving former welfare recipients into the workforce as permanent wage earners, therefore helping all citizens to participate in society.

For every 1,000 drivers who leave their cars at home and commute on public transportation, 273,000 fewer gallons of fuel are consumed each year. And finally, public transportation reinforces good land use patterns and strengthens communities by improving their quality of life and reducing vehicle miles traveled on our roads.

Last year was a banner year for public transportation. In 2000, public transportation ridership increased by 3.5 percent to a total of 9.4 billion trips, the highest level in more than 40 years. Since 1995, transit ridership has grown 21 percent – faster than the US population (up 4.8 percent), highway use (up 11 percent), and even domestic air travel (up 19 percent).

For the first half of 2001, 33 million trips were made on transit each weekday. Light rail showed the largest increase of 4.2 percent for the first half year, followed by heavy rail at 5.2 percent, and commuter rail at 4.0 percent. Bus use was up also, but only 1.7 percent. This growing number of people using transit shows that when people are given the choice of a convenient, quality ride, many can and will use public transit.

And much of these improvements and expansions are due to the record levels of federal and local investment. In this regard, public transit has benefited from TEA-21, which supports a strong federal role in funding public transportation and strengthens federal, state, and local partnerships. APTA is pleased that President Bush proposed \$6.7 billion for 2002 appropriations, and that he honors the \$36 billion guaranteed under TEA-21. In this partnership, the federal government provides 17 percent of total funding for transit, and 44 percent of the capital financing.

However, to sustain this growth, **Kupersmith** reported, more investment in the years ahead is critical. Current trends suggest that public transportation use could increase by 60 percent over the next 15 years. The American Society of Civil Engineers predicts that public transportation will experience the sharpest growth of any form of transportation this decade, and that improvements to bus and rail facilities cannot keep up with the strains from rapidly increasing ridership. They also find that investing in transit must increase 42 percent to maintain the current levels of service. According to the US Department of Transportation's Conditions and Performance Report, \$17 billion in today's dollars is needed annually just to maintain and improve performance of our nation's transit systems.

TEA-21 will expire on September 30, 2003, and APTA is working with the transit industry and with other groups to cooperate on the next program.

Public transportation is experiencing a renaissance, evidenced by the growth in transit use. However, the nation's systems need increased investment to support the mobility needs of our active population with more quality services in the years to come. APTA believes that public transportation is the smart choice.

David Jones agreed with **Kupersmith** that public transportation is an essential public service, and also reiterated that it is a distressed industry. He discussed the evolution of transit and its political, managerial, and operational challenges in the near future. He presented four historical questions: What are the historical trends of transit ridership? When and why did transit decline? Why did it continue to lose market share? What happened that now enables transit to rebuild since 1996?

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Industry spokesmen and experts tend to argue that transit's decline was due to tax subsidies for highways and freeways, the GI Bill, and mortgage tax deductions, which in combination encouraged automobile use and suburbanization. **Jones**, however, argued that this interpretation of transit's decline does not square with historical records simply because transit's financial distress predates the freeway era, and actually dates to World War I.

Jones discussed the nine major epochs in transit history – (1) electrification and the growth of street railways, (2) World War I and increased wages and financial distress, (3) automotive competition and the initial decline of street railways, (4) the Great Depression and financial attrition, (5) World War II and the physical exhaustion of streetcar systems, (6) postwar labor disputes and bus replacement of streetcars, (7) freeways, suburbanization, and public ownership, (8) OPEC oil shock and operating subsidy, and (9) decline, recovery, and new demography of ridership growth.

The rapid development of streetcars occurred from 1890 to 1907. After 1907, electric utilities, which owned streetcars, shifted their investment emphasis from the railways to power plants and distribution systems needed for household electrification. Around the same time the U.S. economy shifted from a deflationary bias – which allowed fixed fare and monopoly operating rights to maximize profits – to an inflationary bias, which almost guaranteed financial distress.

During the postwar years, the War Labor Board mandated wage raises for street railway workers, and reductions in working hours. By the end of World War I, the streetcar industry was among the nation's most heavily unionized industries. Additionally, changes in regulatory policy relieved the railways of their former franchise obligations for capped fares, and streetcar companies instituted large fare increases to stay afloat. However, these fare increases were large enough to drive off ridership, but not large enough to repair the industry's financial crisis.

During the 1920s, urban and suburban households increasingly bought and used cars for personal and recreational travel. While workers continued to use streetcars for work trips, there was a significant drop in midday trips, as railways lost those riders that were most profitable to carry. This problem of peaking is still unresolved today in the transit industry.

World War II and tire and gas rationing increased ridership, but also wore down the coaches and tracks to the point of physical failure. At the end of the war, work stoppages and labor disruptions forced operators to spend any savings they had acquired during the war. Short on funds, transit companies began to replace their streetcars with buses because it was cheaper in the short run, and because the increasing automobile traffic made streetcar boardings in the center of streets impractical.

Therefore, it was the gradual convergence of strikes, postwar fare increases, suburbanization, and increasing recreational auto use that drove down ridership and sent operators into distress. **Jones** then asked to what extent each had a role in transit's decline. He argued that highway development had a significant effect on reducing the market share of transit, but it extinguished the possibility of transit *growth* rather than directly destroying it.

Subsequently, federal funding was used to sustain operations on the edge of financial failure. Transit's market share has continued to decline, and the FTA has focused on commutes between suburbs and central business districts. **Jones** argued that this is a very small share of commutes, and heavy resources are concentrated on a small segment of the population. Instead, suburb-to-suburb travel is the largest share of transit use today.

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During the 1990s and for the first time since 1922, transit has gained market share under normal peacetime. Given this growth, one would expect to see it foreshadowed in metropolitan areas throughout the 1980s. Looking at census data, **Jones** found, however, that only one metropolitan area forecasted the growth of the 90s. That city was not Portland with its Smart Growth initiative nor any of the metropolitan areas that have financed and built rail transit under the federal transit program. It was Houston, Texas. **Jones** attributed Houston's growth to two reasons – its growing Hispanic immigration and its ubiquitous bus network that provides job access for immigrants unable to afford automobile ownership. It has been demand-side changes rather than supply-side modifications that have helped transit to rebuild its market share.

Jones concluded with a lesson that transit should have been tailoring and adjusting its services to fit with changes in the demography and geography of markets. He acknowledged, of course, that this is easy to say and much harder to do.

DISCUSSION

Ralph Bauer, City of Huntington Beach, asked whether bus or rail was a better choice, given the changing demographics of the region. **Jones** responded that the important question is to ask which one will better match the travel patterns of the region. The industry has been foolish in the concentration of rail in cities with polycentric and dispersed origins and destinations.

Martin Wachs, UC Berkeley, asked whether funding over the last 15-20 years for transit has provided benefits as expected, or incurred more costs instead. **Kupersmith** responded that TEA-21 is unique in that it allows local and regional decision-making. In this regard, it has paid off. **Kupersmith** contested **Jones's** statement that only immigration and the economy explain the increase in transit share, but that investments have also been a factor. The challenge is to determine which investments have or have not made an effect.

Jones responded that it is not clear that we have many good alternatives, and the dilemma is whether to further invest in existing freeways. The dispersion of workplaces and homes guarantees that rail cannot be cost effective and efficient, and congestion continues to increase. Portland will be an interesting study to see if its land use policies produce “Smart Growth.”

SESSION 3: HOW CAN WE BEST MEASURE THE COSTS AND BENEFITS OF TRANSIT?

Brian D. Taylor (Moderator), Director, UCLA Institute of Transportation Studies and Associate Professor of Planning

Don Pickrell, Chief Economist, John A. Volpe National Transportation Systems Center, Cambridge, MA (Presented by Brian Taylor)

Richard Steinmann, Acting Deputy Associate Administrator for Budget and Policy, Office of Policy Development, Federal Transit Administration, Washington, D.C.

Mark DeLucchi, Associate Researcher, Institute of Transportation Studies, UC Davis

Arthur T. Leahy, Chief Executive Officer, Orange County Transportation Authority

Taylor opened the session by describing recent trends in public transit investment and subsidy. Public ownership and subsidized service have characterized the transit industry in the early 1960s through the present. Until the mid-1990s, political support and public investment in transit increased significantly and stabilized ridership. However, performance (i.e. cost performance and cost per output) continued to decline throughout the 1970s and 1980s. Transit fares, in adjusted dollars, also declined as well, and the general trends were more significant and pronounced in the oldest and largest transit agencies.

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The early 1990s saw a loss in ridership followed by encouraging gains and New York alone affected much of this huge change in national ridership figures. The rest of the nation is probably more stable in terms of transit ridership. Metropolitan New York carries one third of the national transit ridership, and the ten largest transit agencies carry almost 60 percent of transit passengers.

Taylor added that the transit industry is asymmetric in terms of organization and space – large transit ridership is concentrated in old dense urban areas. This raises a political problem when, in a political world, resources are allocated for spatial evenness to ensure that jurisdictions receive fair representation. Many federal and state programs therefore fund lightly patronized areas that require higher subsidies per rider than areas and systems that have heavy ridership. Thus, transit policies in the last thirty years have succeeded in spreading funds among taxpayers but not among transit riders.

Transit subsidies also are distributed unevenly among non-spatially defined markets. People traveling to and from areas where parking is expensive (e.g. central business districts and universities) and people who do not have access to private automobiles are the two primary markets for transit, although many new markets are emerging. These uneven demographics create uneven ridership and increase costs significantly.

Transit costs are also extremely variable because of temporal unevenness in patronage and operation. Excess capacity during off-peak hours, temporal and directional peaking, labor and work rules, and equipment constraints create inefficient and costly operation. In addition, different transit modes show significant variations in cost. For example, rail transit requires huge investments in right of ways that cannot be shared by users of other modes. Most transit agencies do not pay much attention to this variability in cost, and simultaneously move toward relatively flat fare structures. Since subsidies are the difference between costs and fares, subsidies per rider vary a lot.

Due to travel problems, **Brian Taylor** presented **Don Pickrell's** work, which is an update to his original study on the effects of subsidies on public transit in the 1980s.

The federal government continues to play a significant role in subsidizing public transit, but over time has significantly reduced operating subsidies. Most operating subsidies now come from state and local sources while most capital funding comes from the federal government. How has this reduction in federal subsidy affected transit?

Ridership and transit performance over the last few years have shown different results from those found in the 1980s. Sixty five percent of subsidies have been supporting increased service, and 11 percent has covered increases in unit costs. This is quite different from the 1980s when most of the subsidies covered increasing costs. Subsidies have helped to keep fares relatively constant (in adjusted dollars), and fares today are similar to fares in the 1960s. In addition, almost 75 percent of federal dollars subsidized new rail lines; 22 percent subsidized new transit vehicles, most of which were buses; and about three percent was spent on bus facilities. This shows an explicit policy choice in spending large portions of federal funds on new rail lines.

Taylor then described changes between 1965 and the 1990s. **Pickrell** found that during this period, regionalization increased and the number of transit operators grew. Smaller transit operators in the fringe of growing metropolitan areas are increasing, and there has been a slow shift back to private firms. Service expansions in route networks have resulted in larger service areas but with thinner coverage. As discussed in other sessions, overall ridership grew, but transit riders per capita decreased. Flat fares were raised, more new vehicles were procured, and rail service significantly increased.

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Regionalization of transit service: Due to consolidation, the number of operators declined. In recent years, the number of urban areas with service has grown, showing that transit moved into smaller metropolitan areas, providing low levels of service.

Re-privatization of transit service: As late as 1965, a third of all transit services were still privately provided. Private operators at the time were running capital stock into the ground, and fares covered the operating costs. By 1985, however, private operators provided only three percent of transit service, mostly through contracts with public authorities. The proportion of transit service operated by private firms then increased in the late 1980s and leveled off in the 1990s.

Increased costs: Costs to provide service also increased. Spreading service to a wider area and more extensive network while carrying fewer passengers does not offer the advantage of carrying many passengers in the same direction at the same time. **Pickrell** found that (1) vehicles in rush hour service have gone up slightly, (2) vehicle-miles operated have increased slightly, and (3) total route-miles have grown more significantly.

Costs have also increased because of higher inputs resulting in lower productivity. For example, in adjusted dollars, the average annual compensation for an employee including wages, fringe benefits and sick days, etc. was \$68,000 in 1995, compared to \$39,000 in 1965. Service outputs (e.g. vehicle miles provided per employee) declined between 1965 and 1975 and then increased between 1975 to 1985. Labor cost per vehicle-mile shows a rapid increase from \$2.93 in 1965 to \$5.17 in 1995. Transit managers and systems have been doing a better job in controlling labor costs in recent years.

Pickrell also found that ridership differed between pre-war rail cities and post-war rail cities. The annual ridership for pre-war rail cities (mainly New York) has been stable, with an increase in the early 1990s and a decrease after 1995. In contrast, post-war rail cities showed significant increases in ridership but not enough to cover the losses felt in New York. Additionally, bus-only cities lost riders. Boardings per vehicle mile (a measure of vehicle utilization) and the average passenger load have decreased in the early years of the 1990s. **Taylor** commented that boardings per vehicle mile have gone up a little bit since 1995. In general, the network has dispersed, carrying fewer passengers, and unevenness in ridership is evident across time periods.

Capital money spent on upgrading aged fleets and capital stock also has been uneven. **Pickrell** found that some older urban systems have had more difficulty in replacing vehicles compared to their less-patronized, suburban counterparts. Capital money is also used in rail systems, and the number of rail systems increased from 32 to 46, between 1975 and 1995. The number of passengers carried on these systems has increased, but has not necessarily increased proportionally with the total system or investment.

Without subsidies, transit would be different in several ways: (1) there would be less service overall, (2) more service would be provided in smaller networks, (3) suburban communities would see reductions in service, (4) heavily patronized lines would experience significant increases in service, (5) wages would decrease, and (6) economic productivity would increase. Finally, **Pickrell** also expects that base fares may not increase dramatically, but would vary more. Less subsidies would result in lower ridership overall.

Transit subsidies have been worthy for some corridors, and perhaps also for total networks. The problem, however, is how to focus public spending to support those transit services that are most heavily used. **Taylor** summarized **Pickrell's** recommendations for reforming transit subsidies: (1) channel operating assistance through umbrella agencies and not operators, (2) merge capital and

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operating assistance programs so transit operators can make better use of rolling stock and resources, (3) allow agencies to move subsidies across highway trust funds for localized choices, and (4) reconsider dedicated taxes and earmarking which currently benefit only some constituents.

Richard Steinmann discussed measuring transit benefits from two perspectives. He first described traditional measures based on internal economic performance, such as service measures, expense per revenue vehicle mile, and factors related to service consumption. In contrast, the FTA examines a more broadly defined set of costs and benefits, particularly focusing on the benefits produced by service and investments, using a public policy approach.

Specifically, the FTA identifies three public policy functions for transit – providing basic mobility, assisting in congestion management, and facilitating livable communities. First, basic mobility is a measure of how well transit serves the needs of transit dependents who are not likely to enjoy the full benefits of highway transportation systems because age, disability, or income prevent them from driving private automobiles. This tends to be transit's role in smaller areas, rural areas, and in low-density portions of urban areas.

Second, transit tends to best achieve congestion management results where it operates on separate right of ways, and serves peak period work commutes. This type of investment tends to benefit all users of the transportation system – not only transit riders but also highway users as well.

Third, livable community measures describe how well transit serves transit oriented developments (TOD), maintains or minimizes costs for new infrastructure investments outside of the area, reduces automobile vehicle miles traveled through land use coordination, and ultimately, how well it reduces household expenditures for automobile ownership and maintenance. In essence, this public policy function approach is similar to the idea of classifying highways, but distinguishes various transit services and goals in the field.

Steinmann reported that the FTA is developing ways to handle the role of transit in each of the three areas, using on-board surveys and transit performance monitoring systems (TPMS). TPMS survey questions are related to public policy purposes and explore individual transit trips' purposes, access and egress modes, transfers, frequencies, duration, auto availability, traveler demographics, and other agency-defined questions.

The FTA is identifying user characteristics and service quality measures using common instruments across transit agencies. Nine pilot surveys have been completed across the US, and FTA is working with APTA to extend the approach, expand the data, and institutionalize the method among transit agencies in the nation.

Fifty-nine percent of trips serve the basic mobility function, serving trips for which an automobile is not available, and for travelers whose annual household income is less than \$20,000. Seventy-nine percent of trips serve the congestion management function. Since the trip purpose in this case tends to be journey to work, these are trips which people would still make, even without transit. Fifty-four percent of trips are non-work trips. In some cases, the numbers add up to more than 100 percent, because many trips serve more than one of these functions.

Steinmann estimated that the congestion management function nationally is worth \$19 billion a year, which is based on a national model of pricing issues and net changes in user costs. The basic mobility function is worth \$23 billion a year using consumer surplus approaches to examine how low-income households benefit. The livable communities function is worth \$20 billion a year based on reduced auto ownership and operating costs, environmental benefits, and property

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values. Comparing these numbers to the transportation spending of \$20 billion a year, there is substantial net benefit in the aggregate basis to support transit.

TEA-21 authorized \$6 billion for New Starts projects, which is one-sixth of the TEA-21 total authorization. The rest of the funding is allocated by a formula. Twenty-nine fully-funded grant programs exist right now, 13 projects are in final design, 34 projects are in preliminary engineering, and at least 110 planning studies are being conducted around the country. FTA expects that a number of these projects will move from planning to preliminary engineering and from preliminary engineering to final design in the next few months.

Steinmann described some statutory criteria that are assessed to justify these projects prior to recommendation to Congress. There are mainly five justification measures: (1) transportation system user benefits (a measure of cost effectiveness), (2) mobility improvement, (3) environmental improvement and benefits, (4) operating efficiencies, and (5) transit supportive land use policies.

Most attention is focused on transportation system user benefits, followed by land use and mobility improvement. **Steinmann** did not see much change in operating efficiency measures in terms of cost per passenger-mile and in environmental benefits. Rail investment tends to maintain the existing system cost structure.

Tradeoffs have to be made between the different classes of benefits that are important for transit markets. There are significant differences between types of service, between types of benefits they produce, and between types of expectation that they have. It is useful to try to examine the benefits of equations as well as the costs, looking at both public assistance and what transit is achieving, and looking at benefits that individual investments make.

Mark DeLucchi introduced his presentation by asking two questions: (1) will people use transit if we get prices right, and (2) does travel by private automobiles subsidize travel by transit?

DeLucchi has found that the average subsidy for transit is no smaller than the average subsidy for auto. Therefore, if we charge the right prices for the use of automobile and transit, both full cost accounting and efficient price accounting would make autos less costly than transit, and consequently reduce transit usage.

Subsidy is the difference between what users actually pay for a mode and what costs they should pay according to some accounting system. What they should pay in full cost accounting is anything that can be attributed to costs of a mode. In contrast, in the efficient pricing regime, what users should pay is the price given an efficient market. Since we do not really know the efficiency of the transit market, it is difficult to exact the right efficient transit price.

In terms of both total subsidy per vehicle mile and total subsidy per passenger mile, transit is on average subsidized more than private autos mainly due to direct government subsidies which are much higher than any other subsidy categories. Government subsidies are measured in three different ways corresponding to ways in which the efficient price might be coming up. Specifically, for example, in the case of buses, subsidy per vehicle mile is 3.39 cents in 1990 dollars, and is calculated by all operating costs minus fares. Operating cost plus rolling stock cost, minus fares, is 3.98 cent for a transit bus, and the full cost accounting, including capital costs, is 4.65 cents.

Even air pollution costs estimated per vehicle mile, which is the largest of the other subsidies (or externalities), is one or two orders of magnitude smaller than direct government subsidies. This is

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why any sort of getting the prices right and getting rid of subsidies are dominated by direct government subsidies not made up by other small subsidies. Most of these air pollution costs get very close to zero if we replace cars with the cleanest modern vehicles. In his analysis of subsidies, air pollution costs are large, but drop out from the math with clean vehicles. This analysis includes all pollutants, all parts in the fuel cycles, and damages other than health such as agricultural crop, disability, and estimated global warming damages.

Energy externality and water pollutant costs are also relatively small. These impacts are dominated mainly by estimated macro economic impacts of importing oil. Noise costs are much smaller – three orders smaller compared to other impacts.

In congestion costs, the efficient pricing regime is interesting. Infrastructure costs for gasoline automobile shows up, because optimal congestion tolls from existing highway capacity are, given constant return to scale, equal to marginal costs of highway capacity expansion. This also turns out to be roughly equal to four cents per vehicle mile—about equal to the capital cost of loaded highway annually, multiplied 80 cent per mile by 20 to get 8 billion dollars total annual costs. (Multiply cent per mile by 20 to get total annual cost.) On a passenger mile basis, buses have the advantage and are one order of magnitude lower, since costs are divided by the number of passengers. The difference is again trivial compared to direct government subsidy. Since infrastructure cost is arguably accounted for in the efficient regime within congestion costs, marginal highway service and maintenance costs are attributable to actually on-going uses by autos and buses, and are very small. The magnitude is much higher for buses due to more significant wear and tear of highways per vehicle mile.

Unpriced parking costs are relatively large, reaching as much as \$160 billion annually in the full cost accounting scheme. However, in the efficient pricing regime, the challenge is to remove any distortion in the present parking market, which would result in unpriced parking becoming priced. **DeLucchi** believes that the change would be relatively small, since the lowest priced parking is provided by the private sector that made choices not to price parking due to relatively high transaction costs and other factors. If we remove other distortion factors such as taxes, we might see a cent per mile change in parking price.

No matter how **DeLucchi** did the accounting, he found negative subsidies. All of the currently paid user fees are deducted, because neither efficient price nor the actual real cost is accounted for in the analysis. The result of the efficient highway user fees is roughly 2.77 cent per mile, \$50 to 60 billion a year. Although sales taxes of vehicles and gasoline are counted as highway user fees, general property taxes are not counted since they are not fees paid by highway users. Costs for electric vehicles are very similar to gasoline vehicles except they have higher manufacturing costs that are not trivial compared to gasoline vehicles.

Total subsidy per vehicle mile is about a quarter of magnitude higher for transit than for autos. On the basis of per passenger mile taking into account vehicle occupancy (11 for bus, 26 for light rail, and 22 for heavy rail), the full cost comparison, on the high end of the range, shows higher subsidies for transit than for autos even if you use twice the average occupancy rate. In the efficient price regime, the occupancy rate is much higher than the average results in per passenger mile subsidy that is lower for transit than autos in some cases. The overall story is clear that on average, subsidies per passenger mile for transit are significantly higher than for automobiles. Only in a few cases in which there are relatively low costs and relatively high ridership competing against high costs of automobiles, would one find subsidies for transit roughly equal to those for automobiles.

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Conclusions:

- Neither full-cost pricing nor efficient pricing of all modes is likely to get people out of cars, and may in fact get people into cars, which is consistent with **Pickrell's** finding that transit subsidies account for 30-40 percent of ridership more than in the absence of subsidies.
- Although it is possible to set prices differently to get people out of their cars and make them use transit, it would be neither full-cost nor efficiency pricing.
- These findings are limited because they don't tell us about efficiency in transit in any particular model. There are many markets in which you can do this kind of analysis in significant detail, and find that subsidies for transit are not more than subsidies for automobiles for a specific corridor market. These results do not say much about the importance of reliability of transit in general, which is not a reason of economic efficiency but prevents people from using transit. It does not tell us about the desirability of pricing in general, although there is much information in the analysis for what you can expect when you get prices right.

Arthur T. Leahy, as a commenter, talked about experiences at Orange County Transportation Authority which has a very broad authority in transportation and transit: highway, street maintenance, commuter rail, bus, light rail, and so on. OCTA recently started ten very broad initiatives, including adding additional HOV lanes that will be implemented by a design-build approach to get projects done three or four years faster than more conventional means.

Orange County has grown from an agricultural area into very heavy urban usage. Population in Orange County was 2.8 million people in 1990, and will be larger than that in LA in 1990.

The idea that Orange County should be a worldwide urban area is affecting investment in Orange County, and people are willing to make investment decisions. However, a major new light rail project was put on hold lacking public support. If people say the area is urbanized, they support the light rail project. If people want Orange County to be a suburban area, they oppose LRT. Based on this, **Leahy** suggested that attitude toward a project is a function of elaborate economic arguments about what kind of place the county is and what kind of a place it wants to be in the future. A question about whether light rail is effective or not depends on where it is, what it does, what the ridership is, and what the whole county is going to do to make sense out of a project.

Transit managers have become attuned to city councils, the state legislature, Congress, and federal executives, since they supply money, legal authority, and more to carry out projects. This affects how transit agencies make decisions. For example, OCTA reduced the capacity of a full-size bus by 20 percent and increased the cost of the vehicle, due to federal safety rules for wheel chair space and facilities for people with cane or crutch.

Leahy also outlined some other observations about public transit and how it operates: (1) transit employees can strike, (2) unions are strong, (3) they have federal protections, and (4) they are politically active and pursue their interests. They are public employees with significant impact on decisions to be made. For example, there is a debate about public and private ownership. With regard to this issue, **Leahy** reported that agencies must do things to increase competition in order to increase efficiency.

DISCUSSION

Brian Taylor commented that we need to do a better job thinking of all possible substantial benefits that transit produces. There are financial benefits that society accrues by investing in public transit. Second, financial accounting of costs of transit and automobile systems suggests that the difference in subsidies may not be as large as other people suggested. Some suggest that

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these analyses may be of limited use when the political realm argues whether or not we should invest.

Bev Perry, Brea City Council, and member of SCAG, asked about the cost of travel time on transit. **Steimann** said that time is an important factor, and that travel time savings is one measure of importance to the transportation system user. **DeLucchi** added that this does not come up in the analysis of subsidies because users do not pay for travel time. **Leahy** further added that transit needs to provide faster service for transit users.

Pete Fielding, University of California, Irvine, asked why **DeLucchi** found no government subsidy for passenger travel by automobiles, when significant highway costs are covered by property taxes in some areas. **DeLucchi** responded that relevant costs which are either highway capital or infrastructure costs or operating, maintenance, and service costs are already accounted for in other numbers in his analysis.

Mark Brucker, US EPA, referred to **Pickrell's** and **DeLucchi's** findings, and argued that subsidies do not increase efficiency in transit operation nor provide benefits for society or for transit dependents; they instead appear to serve special interests. **Steinmann** disagreed with this observation saying that 65 percent of subsidies were used to directly provide service.

Don Shoup, UCLA, commented on **DeLucchi's** analysis. Transit agencies tends to concentrate services in high-density corridors, which require fewer subsidies. In many cases, **DeLucchi's** estimates of subsidies are averaged across the nation, and are much less useful than differentiated estimates for different areas, such as where light rail or bus rapid transit systems are being developed. **DeLucchi** agreed with **Shoup's** comment that it is more useful to focus on specific areas. He stated that it is hard to include a sufficient number of people in the analysis for a specific corridor in order to get quantitatively significant results. It is useful to examine whether or not transit lines are competitive and whether there are any other benefits beside air pollution examining the impact of transportation cost on specific corridors.

Roger Teal asked how changes in new automobile technology such as alternative fuel vehicles and buses affect results on the transit side. **DeLucchi** replied that air pollution costs would be close to zero. He actually examined the costs of CNG buses, clean natural gas diesel, buses using efficient traps diesel, and hydrogen fuel cell vehicles. The annualized capital costs of CNG buses and hydrogen fuel costs are higher than the monetary value of reduction in air pollution. Therefore, external benefits of buying these buses compared to cleanest diesels are less than the current costs of converting. As a result, overall social costs are higher to switch to CNG or hydrogen fuel cells. In the long run, the costs of these alternative fuel buses get comparable to diesel fuel vehicles, and produce net benefits. The main point is that air pollution benefits are getting smaller all the time, and converting vehicles still costs a lot.

Michael Moore, California Energy Commission, commented that in the planning process, people move in and out, and therefore we may plan for people who will live in an area based on voices of people currently living there. These people make different commitments and have different ethics. In this situation, isn't it more appropriate to plan improvements for new communities as opposed to refitting something to an existing community? **Taylor** responded that people choose their communities based on factors that are much broader than transit subsidies, and it is hard to separate out all other things that may be affecting choices.

SESSION 4: JUST TRANSIT? TRANSIT DEPENDENTS, CIVIL RIGHTS, AND TRANSIT POLICY

Martin Wachs (Moderator), Director, Institute of Transportation Studies, and Professor of City & Regional Planning and Civil & Environmental Engineering, UC Berkeley

Brian D. Taylor, Director, Institute of Transportation Studies and Associate Professor of Planning, UCLA

Paul Ong, Director, Lewis Center for Regional Planning Studies and Professor of Urban Planning, UCLA

Jeff Hobson, East Bay Coordinator, Bay Area Transportation and Land Use Coalition

Michael Townes (Commenter), Executive Director, Transportation District Commission of Hampton Roads, Hampton, VA

Martin Wachs opened the session by introducing its theme: justice and equity in the provision of public transit service, issues related to transit dependency and civil rights, and how to affect transit policies. Efficiency issues are in fact very much less important in politics than equity. Who pays in relation to who benefits is critically important. Because of the lawsuit between the Bus Riders Union and Los Angeles Metropolitan Transportation Authority regarding transit equity issues, there is substantially high interest in the entire nation as well as in the Southern California.

Brian Taylor introduced different ways in which equity is defined, measured, and evaluated specifically in public transit. It is safe to say that equity in public transit in recent years has been centered on defining a fair distribution of resources among jurisdictions. This tendency to treat voters equally creates a serious problem because consumption of public transit service is asymmetric spatially. It is important to keep in mind that there is enormous variability in ridership among transit systems and service areas. Ten of the largest transit systems account for 60 percent of all transit trips, and about a third of ridership in the nation is taken in the New York metropolitan area.

The fact that the finance system allocates funds equally among jurisdictions while consumption is unequal results in unevenness in two characteristics. First, transit systems in oldest and largest cities tend to receive the highest taxpayer subsidies in absolute terms because they are carrying more of an enormous number of transit riders than those of newer and smaller suburban systems. In contrast, newer and smaller suburban systems tend to receive the highest taxpayer subsidy in relative terms, and consequently a much higher per rider subsidy.

Why do we subsidize public transit? The first reason found in the literature is to provide direct benefits to users, provide mobility to people who do not have access to automobiles, and to provide travel options to people who choose not to drive. The second reason is to provide indirect benefits—locally relieve congestion, reduce travel time for all travelers, reduce energy consumption, reduce vehicle emission, control sprawl, minimize the amount of land devoted to roads, motor vehicle noise, and so on. The third reason is network service economy – subsidies are needed to maintain a comprehensive network and provide a minimum level of service. Fourth, transit is subsidized to compensate for public policies that do not charge drivers for the full social cost of the automobile use. Fifth, transit is subsidized to provide indispensable service for transit dependents. This last reason is not often popular among elected officials, especially because spatially distributed benefits gain more political support. However, this is the most compelling rationale for transit subsidies.

The truth about transit is most transit users are poor bus riders. And economic status of transit riders has gradually declined over time relative to the general population. Also, the 1995 NPTS

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clearly showed the median and modal household income for various transit modes are significantly lower for transit buses than for urban rail, commuter rail, and private cars.

This fact brings us to two conflicting policy goals: 1) serving low-income transit dependents, and 2) expanding commuter-oriented service. ISTEA and TEA-21 require transit agencies receiving federal funds to comply with civil right acts. Transit agencies are required to operate services within strict fare policies, and are also required to expand commuter-oriented services at the same time. The equity issue associated with these policies has been raised to a significantly higher level with the lawsuit in Los Angeles.

A policy question guiding the research in this area is, "Who wins and who loses in subsidies of public transit in general?" Subsidies of public transit are progressive or regressive with respect to income, specifically, how transit subsidies are distributed among various classes of users.

Findings in a nutshell: First, because taxes used to support transit are generally progressive, transit subsidies tend to redistribute transportation benefits from high-income people to low-income people. However, low-income, non-transit users are losers since users are getting subsidies by using transit. Second, among transit users, the distribution of transit subsidies is generally regressive with respect to income. Higher income transit users tend to be subsidized more than lower-income transit users.

What are subsidies per passenger trip for various user groups? **Taylor** described the complex process of estimating the distribution of transit subsidies among various users. First, cost per vehicle hour by time of day, by line, and by mode was estimated based on cost allocation models developed in the study. This cost per vehicle hour was used to calculate cost per passenger mile. Then cost per trip took into account cost per passenger mile by time of day, by line, and by mode and the trip distance. A fare that each passenger paid to take a trip was subtracted from cost for that trip to calculate subsidies per trip. Finally, subsidy per trip was aggregated for various demographic groups.

Because of problems of peaking, the marginal cost of providing transit service is highest in the peak period and in the peak direction. The problem of peaking combined with restrictions in the use of part-time labor limits efficiency and lowers the efficiency of vehicle utilization for transit agencies to satisfy the uneven demand. This results in a higher proportion of revenue service, deadheads, and scaling facilities to accommodate the uneven demand. All things combined significantly increase the peak cost.

More sophisticated cost allocation models were developed to estimate exactly how much it would cost the MTA to have a bus and a rail in service. Cost of providing service during the off-peak period was found less than the MTA's daily average cost estimate, while cost during the peak was much higher. The full-cost allocation model showed that the off-peak cost was still lower than the MTA's estimate while the peak cost was quite higher because of the resources allocated to the peak period. The fact that LAMTA and OCTA have one of the lowest peak-to-base ratios among the 27 largest transit systems in the US implies that the difference in costs is likely to be larger for other large transit systems than for LAMTA. Comparing cost per passenger capacity (seat plus standee) hour, the vast majority of difference in costs between bus and light rail modes was found to be due to the costs of right-of-way for exclusive rail use for rails as opposed to roads that are shared by buses and automobiles users.

Most users in the LAMTA system are transit dependents, based on demographic data in 1995. Per trip subsidy for service types of mode is higher for high-income users - especially those who use express buses and light rail than for low-income users. Among bus services, mainly medium and

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higher-income users utilize express buses, whose long distance trips cost a lot and require high subsidies, while most local bus riders are low-income riders. In terms of race and ethnicity, small differences were found among bus riders on express buses and the Blue Line in Los Angeles. Asian/Pacific Islander and Anglos have substantially higher subsidies than Afro-Americans and Hispanics. This has to do with the ridership pattern of each group. By age and sex groups, subsidies per passenger trip are higher among the elderly, and slightly higher for men.

Factors influencing demographic variation in subsidies: First, demographic variations in transit subsidies are due to demographic variation in service consumption in terms of travel distance and transit mode. Most of the differences in subsidy levels by income are due (primarily) to the longer average trip distances of higher-income riders, which is often combined by a flat fare and unlimited ride passes paying less per mile of service, and (secondarily) to their greater use of capital-intensive and commuter-oriented modes. Second, subsidies by time of day vary little after controlling for trip distance and travel mode. The higher unit costs of service supplied during peak periods are mitigated by higher levels of peak period utilization in the LAMTA case. This would likely change, however, should the MTA expand peak period service in an effort to reduce standees. It should be mentioned that the results presented here are preliminary. In addition, although those data are from LAMTA, this is not a study on LAMTA in particular. The difference observed here is higher for other transit operators taking into account the MTA's low peak-to-base ratio.

Conclusions: Because the subsidy of a transit trip is a function of the variable cost of that trip minus the fare paid by a traveler, the key to equalizing subsidies is fare policy. Transit managers, who often have a very good sense of the average cost, should also have a clear sense of the variability of service production costs. As a general principle, fares should be set to vary in rough proportion with costs. The adoption of such a marginal, cost-based fare structure can simultaneously increase both efficiency and equity in the use and subsidy of transit service.

Efficiency would increase by: 1) encouraging passengers to consume more inexpensive-to-provide transit service (short, off-peak bus trips), 2) encouraging passengers to be more judicious in their consumption of expensive-to-provide transit service (long, peak trips on capital intensive modes). In concert, these two factors would work to decrease overall subsidies per rider. Equity would increase by: 1) lowering, in relative terms, the price of transit services disproportionately consumed by low-income passengers; and 2) increasing, relatively, the price of transit services disproportionately consumed by higher-income passengers. In concert, these two factors would work to eliminate the regressivity of current transit subsidies.

Wachs introduced **Paul Ong** as one of a few people who has been carefully studying transportation needs of welfare-to-work communities for a long period of time. He has examined the roles of transportation as part of welfare-to-work programs, which are transition programs and opportunities for low-income people to find employment.

Ong introduced the contents of his talk based on a case study – the examination of poor people's way to get around and its implications of reinventing public transit service – with a challenge to treat transit as a subset of larger transportation issues and policies.

Using two categories, income and mode (private car and transit) to define transportation classes, **Ong** identified four categories: 1) rich/private car, 2) rich/public transit, 3) poor/private car, and 4) poor/public transit. Public policies are concerned with two key policy issues: 1) allocation of resources to different classes, and 2) how we shift the boundaries between these classes—clearly allocating funds to one sector shifts the boundaries and policy settings.

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His study examined: 1) transportation behavior of the welfare population, 2) transportation resources that shape behaviors, and 3) transportation preference that is observed through typical travel patterns.

The welfare poor are not very different from the low-income population, although they are not identical. Trip purposes are also similar between the welfare poor and the poor. The best way to study needs is to break them down according to their stage in moving off welfare. The population of unemployment, under legislative requirement of finding a job at the time of **Ong's** survey, consists of (1) those who are exempt temporarily, (2) those who are not working, and (3) those who are not necessarily searching for work.

Ong observed an increase in the number of trips, but surprisingly, the largest increase in trips was not due to the transition into employment. He explained that job searches are done regularly, as CalWorks legislation actually requires people to go out and do some number of job searches each day, and these travel needs create trips.

He also found that the characteristics of travel – particularly whether a trip is difficult to make or not – affect mode choice. Looking for a job and commuting to work are less difficult if one has a car, and the commute time makes a huge difference on mode choice.

For job seekers, **Ong** looked at those who have unlimited access to a household car, those who have limited access, and those with no access. It is not surprising that people will use a car if they have a car, but he also found that people who do not have a car try to find ways to access a car. This is actually true for both job seekers and those who are working. This shows a sense of preference, and also highlights a number of other concerns and travel needs best served by a car, such as child-care responsibilities.

Within each of the four groups, defined by two factors—1) the level of service that is measured by the number of bus stops in the neighborhood, lines, runs, etc., and 2) the density of welfare population, he identified transit problems. Overcrowding, bus stop safety, and the level of service are the top three.

Looking at the facts of transit resources as the primary objective of welfare reform, we examined how effective two different types of resources are in terms of finding employment. In the previous research, we found that having an automobile makes a significant difference. Additional research that addressed an endogeneity problem - we don't know: employment gets a car or a car gets employment - found that the remarkable cost of car ownership is insurance costs. Two persons who have identical characteristics and driving records but living in two different places get totally different premiums. Insurance costs make a huge difference in car ownership for a minority. Many people do not have a car because of finance, and would want to have loans to get a car if transportation policy makes it available.

If you live in a good neighborhood and have a low premium to own a car, you are likely to find a job. For the transit dependent population, the higher level of transit service leads to greater probability of finding and keeping a job. All of these resources, automobiles or the higher level of transit service, lead to higher employment, and this is what we want on welfare reform.

Comparing two types of resources to promote in transportation policies for welfare reform in relation to the transportation class diagram, we need to think more just about transit justice and transit fairness. Equity is hard to define. While one way to define it is how benefits and costs are distributed, another way is what is fair. We also need to define fairness as a benchmark. We need to think about not only vertical equity, that is transit between two income groups with keeping

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transit mode constant, but also horizontal equity, that is distribution of resources within economic classes. Although there is an automatic assumption that we talk about welfare recipients, about the poor, and then about public transit, the world of welfare recipients are not made up only by transit dependents. Although in some way you can't get away from targeted and isolated programs and policies, you have to expand a discussion to have universality. Otherwise, we stigmatize the class.

Jeff Hobson discussed how his coalition addresses the split between social justice and environmental advocacy that has caused tension among advocacy groups around the country. In the Bay Area, he put together a report called "World Class Transit," which was the basis of the talk.

Regarding ways by which the coalition has been able to bridge the gap between environmental and social justice advocates, **Hobson** suggested that current transportation planning does not adequately address the needs of transit dependents. Transportation agencies could do much more to serve both transit dependents and choice riders, if they focused primarily on more cost-effective transit — especially if the money to provide services, primarily for choice riders, was saved to revitalize services for transit dependents.

Bay Area Transportation and Land Use Coalition (BATLUC) is a transportation and land use coalition of public interest groups, working to maintain the region's quality of life, to protect the natural environment, and to promote social equity. It started a campaign in 1998 by addressing the regional transportation plan. At the time, MTC was planning on having a \$375 million shortfall for its transportation maintenance budget. Social justice groups were concerned that would lead to service cuts and fare hikes, and environmental groups were concerned that would lead to reduction in transportation choices and more automobile use. In the end, the commission overruled the staff's recommendation and took the coalition's recommendations.

In the next year, the coalition moved to the community level and dealt with Alameda County Measure B. The previous attempt to reauthorize the county sales tax failed in 1998. In 1999, the coalition brought together environmental opponents of the 1998 plan, as well as social justice advocates, and successfully argued for a \$186 million increase in funding for transit operations, paratransit, and biking and pedestrian safety. The result was an 81.5 percent of yes votes.

This year, the coalition is focusing on the 2001 Regional Transportation Plan (RTP) in the Bay Area. The coalition believes that current transportation planning processes do not adequately serve transit dependents and goals of equity. This is not surprising, taking into account other poor public services in poor communities. Only ten projects address equity in the MTC analysis of how many projects with discretionary funding address each goal in the RTP. And, only six percent of the countywide projects in the 25-year RTP address equity.

It is unquestionable that transit agencies are spending a huge amount of money to move high-income, typically white commuters over long distances, simultaneously cutting services and raising fares for low-income minority bus riders. In Silicon Valley, the Valley Transportation Authority (VTA) proposed a \$4 billion BART extension into downtown San Jose. The project is so big and so politically important that they were able to convince the MTC to delay the RTP adoption for a month to allow VTA to finish negotiations to strike a deal to protect the existing BART system from stressing a whole new market. That is an important deal to get those protections in place for the existing system. But it won't address one of the other biggest problems in the proposal – the effects on bus riders in San Jose. VTA tried to meet the full costs and tradeoffs, and avoided releasing the detail cost estimates before last November's vote for

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sales tax intended to provide significant funding for the project. Those estimates left out some of the very important funding that would be needed such as operating, financing, mitigation, etc.

Full cost estimates that overextended the economic uncertainty and environmental justice risks suggested an additional \$2-4 billion that would be needed for the extension of BART. Experience and political calculus suggest that this project could result in service cuts and fare hikes for bus riders. Because protections are not in place for bus service, VTA, MTC, and BART will be seeing the same mass protests and lawsuits that played out in Los Angeles. Crowds will head to Washington to lobby against New Starts funding if it will hurt bus riders.

However, it does not have to be this way. Agencies can do a better job of serving both transit dependents and choice riders if the focus is on cost effective transit. First, to serve transit dependents, we need to revitalize local transit service. Low-income communities need frequent, affordable, 24-hour/7-day services that connect them to jobs and central services. The MTC deserves some credit for taking this analysis up to the regional level, and there have been great planning efforts so far. But the money issue – who pays for it – still has not been resolved.

Transit dependents need transit services that require more operating money. This will probably shift some capital funds to operating funds by making transit services provided for choice riders much more cost-effective than actually seen now. This is more cost-effective transit. Solutions have some things in common: (1) they make a lot of use of existing infrastructure, and (2) they can be increased incrementally to match supply to demand. We have to remember this is not just choosing the right type of transit.

Governor Davis said that the highway construction is over, but we are still putting billions of dollars into freeway expansion in areas where they could be used for efficient transit instead. The Bay Area coalition is opposing \$200 million to drill another hole in the East Bay hills to promote reverse commute job sprawl. Instead, they could use the fraction of that money to fill out empty seats on reverse commuter trains that are already running. It does not make sense to initiate BART shuttles to job centers, when resources could be used for putting more services and more people into the off-peak that would make the whole system more efficient.

In terms of transportation, land use, and environment connections, it is important to invest in communities with transportation choices. It is worth replicating some of the projects that the MTC initiated. One of these new community transportation planning efforts in which nearly \$10 million of planning funds are allocated for environmental justice, community planning, and other programs hope to indicate a fundamental shift in how Caltrans sees its mission.

Hobson discussed some things that agencies and elected officials should and can do: 1) start by implementing useful targeted programs, such as MTC programs, lifeline transit networks, transportation livable communities, housing incentive programs, community transportation plans, programs for affordability, and children's transportation, 2) apply project-level equity safeguards to deal with the regional process by requiring full disclosure of true costs of projects, 3) use funding flexibility to transfer money to agencies and modes that serve transit dependents most, and 4) increase transit operations funds.

Michael Townes, commenter, agreed with **Hobson** that there needs to be more transit operating funding. As a political scientist, planner, and transit practitioner, **Townes** is aware of what is theoretical and what is real. He suggested that analyses should be tempered with what happens on the ground. He commented that the analyses presented scholarly and analytical justifications for not investing in transit because it does not work. But **Townes** suggested that if we do not invest in transit, transit cannot work. Transit has been under invested in the US since World War II. Now,

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transit investment is increasing, and transit assets are invested at a higher level. It takes time for people, land use patterns, beliefs, and perceptions to change. **Townes** believes that as these change, people will see productivity in transit. The studies in this session are based on experience in the Bay Area and Southern California that are unique and different from many other parts of the nation. He believes that if a transit system project were abandoned due to opposition from three out of seven communities based on environmental justice issues, this would hurt everybody in the region by worsened congestion and reduced mobility. Cost-benefit analysis often misses the core point: what is the quality of life you want in future, how do people want to live, and how do you want to include people in society?

Townes commented that there is pressure from suburban communities to build expensive and unjustified transit systems at the expense of poorer systems in inner cities. Republicans admit that we need better transit services but do not want to invest in operating funds. They want to play a game called “innovative finance,” where we borrow from the future to invest in the present.

DISCUSSION

Jim Ortner, Orange County Transportation Authority, talked about the difficulty in developing a social contract. In a sense, choice riders are taxpayers in a regional context while transit dependents are recipients of most tax revenues. One of the mistakes in Los Angeles is the failure to develop this kind of contract that they started to develop in the Bay Area when one begins to recognize there are needs of choice riders and taxpayers. They need to be matched. He asked for recommendations on how to develop that kind of contract.

Townes discussed that there is room for social contracts. In fact, one of the reasons why transit agencies tend to spend a large amount of finances serving lower population density and suburban areas is due to political support. In **Townes’s** view, it is going to take concerted efforts by a comprehensive group of people, transit managers and local politicians, who begin to see the costs of maintaining more roads and the social costs of sprawl, and to understand that as we age we have to drive more. Joining these different needs might help address and build transit systems to meet some of these insufficiencies. This union, along with knowledgeable people and establishment of social contracts, might also address operating and capital funds of public transit. There should also be “contracts” between modes because we understand that one cannot be successful without the other.

Hobson provided an answer for how to achieve the social contract from his perspective. Coalitions of environmental justice groups, environmental groups, and suburban neighborhood association groups, are trying to help land use transportation and land use agencies to solve the problem. One way that could work is from the recent experience of working with the Metropolitan Transportation Commission and creating an idea to have free transit in the city of Richmond, which is a relatively poor, predominantly Afro-American community in the East Bay. This idea was not from the positive report on free bus passes for students and for low-income groups but from a story of a 13 year old boy who commented in front of the commission on his tradeoff between paying for bus fare or for lunch at the end of a month. This kind of issue may not necessarily be raised for all transit agencies due to the extent that we recognize the transit agency is a social service provider. Social economic contracts should recognize ends and means that increase economic and education opportunities for all of our neighbors.

Ken Schreiber, Mineta Transportation Institute, stated that it is necessary to view the entire socially disadvantaged community as one community, both car drivers and bus riders as one community, for building coalitions and achieving equity. He asked a question regarding any experience or any study for political viability of legislation that put the registration fees on all

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cars to make transit fare free. This kind of legislation makes a fundamentally different offer by making transit more economically attractive and making car driving more expensive.

Hobson responded by introducing an example that the commission in the Bay Area failed during last Fall to pass legislation to increase vehicle license fees and use the resulting funds to pay for a variety of transportation alternatives because it did not explicitly say that people may use public transportation in addition to increasing fees.

Ong discussed his concerns about the risk in political discourse about how to talk about the poor. There is a problem in equity discussions about the way the poor and welfare recipients are viewed, which is driven by myth. For example, one myth is that we automatically connect social welfare recipients with transit dependents. Ninety-four percent of welfare recipients having no cars is a myth, and no one has been able to track it down. All surveys that have been conducted in many different areas show a higher percentage of car ownership. If we target a discussion about transitlessness, discussion about how to help the poor find employment ignores car ownership. Although it is true that those who own a car seldom use transit, those who do not own a car drive a car if they have access to one. If it is meant to assist the poor, a broader discussion is necessary. It is easy to stigmatize by equating the poor with transit dependents. Often times we talk too much about equity because the universal policy twists the objectives in what must be done in policies.

Townes asked for an example of an experience in which free transit and higher taxes on cars to support all modes can attain more support for such public policies from the public. An indirect answer to the question is a successful example of replicated streetcar systems with experimental grants and support from business in Germany after buses were taken from the roads. This system has become a part of the Bundes Rail and has a large transit ridership. It further reduced congestion. Communities there enjoy light rail transit and reduced congestion.

Jerilyn Lopez Mendoza, an attorney with Environmental Defense, emphasized the importance of equity in public participation during the development of public policies. She introduced an example in Los Angeles. Although there were six public meetings about the proposed Exposition light rail project in the communities where the median income is \$100,000, there were no meetings held in predominantly (70%) Afro-American and Latino communities where the median income is \$25,000, or where people were not contacted by the MTA regarding the track to connect the maintenance yard that runs in their neighborhood. In many cases, elected officials and staff lack sensitivity about public participation of minority communities, especially those who speak only Korean or Spanish and do not understand English. Public agencies have to be proactive to involve minority communities in the process and to understand issues in decision-making that significantly affect their lives.

A person from Surface Transportation Policy Project (STPP) stated that although it is easy to understand that cars work better for low-income persons to get to work, policies toward making car access easier by subsidizing ownership raises a financial question. Cost for car ownership is significantly high and depreciates assets, and contradicts the efforts to build rail, build affordable housing near rail, and increase home ownership by efficient location mortgages. **Ong** said that we need more balanced policy and discussion. There are transportation policies that could more effectively help the poor. One example is ending the redlining done by car insurance companies and barriers for access to capital to purchase cars. It does not seem fair that a person who has a good driving record but lives in a poor neighborhood gets a higher insurance rate. Fairness should cut across modes of transportation as well.

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Townes challenged the idea of looking at transit as social service. He asked, "if there is a certified return, do we make investment?" Get funding and more investment, then more service and more ridership. Transit was once profitable in much less dense areas than Los Angeles County. He pointed out that mass transit during the last four decades has received a significant level of federal subsidies. After providing the reasonable level of investment, we want to see results from that investment.

Taylor concluded by emphasizing the importance of keeping in mind two things: (1) it is not debatable that the vast majority of transit users are in fact low-income, and (2) at the same time the vast majority of low-income people travel by car.

SESSION 5: HOW CAN WE MAKE TRANSIT WORK IN CALIFORNIA?

Brian Smith, Deputy Director, California Department of Transportation (for Jeff Morales, Director)

Donald Shoup (Moderator), Professor and Chair, UCLA Department of Urban Planning

Brian Smith started his talk by mentioning new perspectives in transportation policy in California, which reflect efforts in the nation to go beyond building highways and beltways. He mentioned that during the administration of Governor Davis, California's transportation budget has grown about 50 percent and now \$10 billion a year is available. Over a year ago, Governor Davis signed a law to fund \$3 billion for traffic congestion relief that represented a major shift of state policies away from heavy freeway investment toward a more multi-dimensional, multi-modal, multi-passenger approach. Transit is a big part of the short mission statement for Caltrans, "To improve mobility across California," recognizing that Caltrans needs to provide transit and to be a leader in the transit arena.

Californians have long commute distances. We need to examine the total trip from origin to destination and recognize all available options for making that trip. Then we have to find successful ways to let people make those trips. For example, Caltrans cannot just provide a piece of highway and hope that a bus will use it. Instead, Caltrans has to consider how a bus gets to a HOV lane and how a bus user gets to a bus stop.

Three important points are: 1) money helps, 2) we need a common mission, and 3) we need to ask simple questions such as "What will make me want to ride transit?" and "What is keeping me from riding it?" Chicago increased transit ridership from 1.2 million to 1.5 million in two years despite a declining operating budget and no capital investment. Transit agencies in Chicago achieved this by understanding needs of customers. They remedied things that bothered customers, for example, adding air-conditioning to buses.

It is the state's responsibility to make transit a viable option. Transit viability is a combination of reliability and availability. We also need to ask questions, such as "What are we trying to achieve by transportation investment?" and "How many people are needed to make transit successful?" A transit system is not a stand-alone system but should be part of an interconnected system that is related to the idea of a total trip. In order to make transit more attractive, Caltrans is trying different ways to improve mobility from one place to another, focusing on providing linkage between modes and investing in ways to help people use facilities such as smart parking. Examples are: (1) smart parking in the Bay Area which allows BART riders to use the Internet to find a parking space, and (2) shuttle services to get from stations to destinations as well as origins. Caltrans also looks at walking and biking.

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Public attitudes toward transit in California are definitely changing. Ridership has been increasing 45 percent faster than the national average. In Caltrans surveys, 70 percent of people think transportation should be our major focus for our future. Commuter express rail to Silicon Valley in the Bay Area successfully provides an alternative to the conventional solution of building highway lanes. Giving an effective alternative to people who have to travel on a particular corridor persuades people to support the service. In addition, intercity passenger railroads and related investment show changes. The service, with enough frequencies, provides a viable option to travel without paying for fuel and parking.

At the same time, we also need to recognize land use connections with transportation. Local land use decisions should be made with knowledge about their impacts on mobility. Caltrans does not make land use decisions, but has to take an active role in these decisions by leveraging funding to encourage smart investment. While we have a great road system in place, we have to make the best use of it rather than continuing to build more roads and highways. It is part of Caltrans's responsibility to connect rural and less urban areas to metropolitan areas to satisfy the needs of people living in those areas. In addition, we also have to recognize that urban areas with more highways incur financial and social environment costs on people who often do not even benefit from these facilities.

The mission of the state is to develop a sustainable transportation system. We still have to ensure that the transportation system provides equal support to various socio-economic groups in this racially diverse society. To do that, we have to move beyond an idea of just building roads and highways and recognize that the transportation system has to provide these options, plus transit, bike routes, etc. In any point of our lives, we may depend on various transportation options. The vision is a system with inter-connectivity, multiple options, and multiple investments.

SESSION 6: MATCHING AND SELLING TRANSIT TO EMERGING MARKETS

Donald Shoup (Moderator), Professor and Chair, UCLA Department of Urban Planning

Gordon J. "Pete" Fielding, Professor Emeritus of Social Sciences, UC Irvine

Daniel Fleishman, Principal, Multisystems, Inc., Cambridge, MA

Tom Larwin (Commenter), General Manager, Metropolitan Transit Development Board (MTDB), San Diego

Donald Shoup introduced **Gordon "Pete" Fielding**, who has been a mentor to many younger members of the transportation planning field, and who has helped countless planning students and academics in their careers by giving excellent advice on research. **Shoup** took the opportunity to thank **Fielding** for all the help and encouragement that he has given to the profession.

Fielding posed the question, "what can we expect from public transit?" He discussed some ways that transit has been successful, identified the groups using transit, described services that are attracting riders, and discussed ways to encourage transit agencies to focus on and respond to market opportunities.

A copy of the TCRP Report #28 was included in the symposium book, and **Fielding** thanked Sandy Rosenbloom, who wrote most of the final report. The report contains a wealth of information about market segments, and **Fielding** urged anyone interested in the future of transit to get a copy of the report, available from <http://www.tcrponline.org/>

He summarized the report by beginning with a look at the main users of transit. Not surprisingly, workers with low income and workers with no household cars use transit more than average and

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tend to be the primary users of transit. Another group is college-educated workers in large cities with well-defined business districts downtown and where transit is the primary commute mode. These cities include New York, Chicago, San Francisco, Seattle, Boston and Philadelphia, and transit use is increasing more than we expect.

Another user group includes people in the 17-29 age bracket, who are starting new jobs and entering the labor force. They also include university students. Universities are great markets for public transit, and University of Washington provides an example of using marketing and pricing to attract market segments. The Santa Monica Blue Bus does a wonderful job serving students to and from UCLA, and the University of Texas and University of Illinois are also good examples. In Illinois, the transit system is oriented to the needs of students; at night, buses will drop off female students where they request, and will pick up students anywhere they wave them down to stop. These services encourage people to rely on public transit and create transit support and awareness among young people. And as these people enter the work force, they will take with them these favorable attitudes toward public transportation and habits.

Another group of transit riders are workers with mobility limitations. Women ride more frequently than men; and Black, Hispanic, and Asian workers ride more than Whites. High ridership can be found in areas throughout the U.S. that have high levels of immigration, such as San Diego, Orange County, Chicago, and Miami. However, differences are primarily a function of income. Immigrants, typical of other Americans, use transit but when incomes rise, transit use begins to fall. However, it does not decline as rapidly as it does for the nation as a whole. The immigrant population is an important market for transit, and much of the initial transit use they develop is sustained.

Fielding pointed out that women and particularly Hispanics and Asians are important market segments for transit, regardless of whether they are found in small, medium, or large cities, or in New York or Chicago. **Fielding** also pointed out that it is difficult to develop much market for transit when population per square mile is less than 5,000.

The report also presents numerous case studies of areas where transit is doing better than the national average. **Fielding** summarized several factors that contributed to success -- speed, reliability, comfort, cost, and convenience in terms of both where it goes and when it goes. Light rail and commuter rail are gaining ridership among high income groups and university-educated groups because of these reasons.

Other important strategies used to target market segments include route restructuring, reverse commute services, and services to large employers. Route restructuring is applicable to bus orientation, and this is important because most communities continue to rely on bus transit. Route restructuring tries to make transit more convenient, faster, and more reliable by changing some basic services. For example, those areas that have been successful with restructuring have taken an area of 3-5 square miles that represents a sector of the service area, and re-designed the bus services there, after doing a detailed study of the needs of people in that area. Route restructuring is not a complete overhaul of an entire service area -- that is too difficult.

Sacramento provides a wonderful example. The south side of Sacramento is experiencing more development, and the area is good for transit since it leads out to some further suburban developments and also has a major shopping center that provides a pivot point for bus transfers. Sacramento restructured the routes by interlining them -- where they found too many lines, they brought them together to form fewer lines. By bringing two or more buses on the same line, service ran every eight minutes rather than 20. Sacramento also implemented turnbacks -- instead of running each bus all the way to the northern terminus, every second bus would turn back

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halfway up the route. By cutting out some repetitive services, the agency was able to redirect resources to provide better service to hospitals, social services, and anywhere else people needed to go.

Instead of running buses to downtown, they ran them through downtown and to the other side, where people needed through-routes. They created some unlimited stop and skip stops during the peak period to provide faster service to commuters between the central city and the edges of the town. In one year, they increased ridership in the south side by 4 percent, whereas the bus ridership in the overall area increased only about one half to one percent. In the areas where they restructured routes, passengers per vehicle hour increased 12 percent.

Portland is another good example of an area that monitors service once it is established. It increased ridership by 8,400 additional riders per day on the west side of town. And 68% of these new riders rode in the off-peak periods.

Also, reverse commute services and services to large employers have been successful for many areas. The Pace system in Chicago has been working with large corporations to provide services for employees. New Jersey Transit provides reverse commute services around Princeton. Santa Monica ran early specials to downtown Los Angeles to primarily serve the financial workers, but found that it was also picking up passengers returning to Santa Monica. It then redesigned its services to offer reverse commutes to better serve these markets.

Fielding closed by encouraging participants to pay attention to their communities' needs, as this can make a difference in the success of transit.

Daniel Fleishman pointed out that a broader context for fare policy and marketing has emerged in the last ten years. Agencies are functioning in new contexts of environmental justice and equity concerns, and this context is forcing agencies to rethink how they deliver services, and how they can respond to the changing markets. These new changes present both challenges and opportunities for fare and marketing initiatives, and the development of new tools like electronic fare media are allowing agencies to better address these varied markets.

Equity issues have affected many agencies' fare policies and decisions, either because they are facing legal battles (as with Los Angeles), or they are aware of the possibility of lawsuits.

Fleishman urged that agencies need to work with the community and with local groups in developing fare changes and initiatives so that these changes do not produce results that communities reject.

Fleishman then turned his focus to the possibilities of emerging technologies, such as electronic fare media, including both magnetic fare cards and chip cards, also known as Smart Cards. Magnetic fare cards have been used in many places, including New York, Chicago, and the Los Angeles area. Ventura County has been using smart cards for a number of years now, and is the first system embarking on its second generation of smart cards. Other cities that have adopted smart cards are San Francisco, Los Angeles, and San Diego. California is the vanguard in this arena, but smart cards are growing in general.

In many cases, agencies use the electronic medium to automate their fare collection systems and to provide new payment forms and options, or maybe change from a ten-ride ticket to a stored-value fare card. However, these technological advances can also have an impact on policy. New York is probably the best example. In adopting a new automated fare collection system, it took the opportunity to totally revamp the fare policy. It changed from a flat fare that offered no

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discounts, no passes, and no transfer discounts, to a system that offered a wide array of discount passes (one-day, weekly, monthly), and free transfers.

Another advantage of electronic fare cards is that they can be used for multiple applications – both with transportation and non-transportation related activities. Smart cards can link transit payment with other transportation modes such as parking and/or tolls. One card with stored value can double as a toll transponder, parking entrance card, and transit pass. Also, there is growing interest in providing seamless travel throughout a region, with multiple agencies, and a single fare card. Different neighboring agencies commonly accept transfers or transfer upgrades, and San Diego, for example, has a uniform fare structure agreement among all operators in the region. But, with the development of electronic fare cards, one smart card can be used to travel throughout the region, even without a common fare structure. You could have an electronic fare card that contains a common stored value purse, that all participating agencies would accept, and that card could also be used as a flash pass with other agencies that don't have the same equipment. The ultimate model is complete regional integration where all agencies would have this card reading equipment. And the fare card could also accommodate automatic transfer fare discounts.

The multiple application concept also can include non-transportation-related partnerships as well, including social service programs, schools and universities, and businesses. The new chip cards allow transit agencies to work with social service agencies and employers to provide both better service (in terms of getting people to work) and fare programs (to subsidize the rides). One possibility is to link electronic benefits and fare cards, so people could have one card that has the welfare benefits on it, and they could use the same card to pay for transit.

Another important partnership is with employers, to incorporate employer subsidies. Transit agencies and employers are working together to get employees to use transit, especially using commuter choice programs and pre-tax benefits. Increasingly popular programs like EcoPass are working: Employers buy passes at extreme discounts, and distribute them to their employees. There are also voucher programs, sometimes called transit checks, metro checks, or commuter checks, which are especially effective in regions with multiple operators. These programs allow employees to use their vouchers to buy the fare medium for whatever service desired.

Similarly, university programs have been in operation for a number of years, providing reduced or free fare programs for students. As we will hear later, the UCLA program, called BruinGo! has been in operation for about a year, and the University of Washington has a U-Pass program.

Cards can also be linked with financial institutions and banks, either through joint stored value like an electronic purse, or through an arrangement where you can add value to your transit card at ATMs. Chicago is running a pilot program where one of the banks has agreed to distribute and sell magnetic fare cards through ATMs.

And there are other possible partnerships with retailers, where a stored-value transit card can be used to buy things at a store. These types of programs allow flexible partnerships and innovative loyalty programs akin to a frequent rider or frequent buyer program.

These new opportunities are even more possible with the introduction of smart cards, which can hold more information for multiple use than magnetic strip cards. This new technology allows transit agencies to tap into new markets, work out different payment arrangements and subsidies for varying groups, and new partners can help pay for infrastructure costs such as the distribution of cards.

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Tom Larwin, who has been the General Manager for the Metropolitan Transit Development Board in San Diego for 22 years, commented that every presentation he had heard in the symposium could be a two-day exercise in discussion and seminar, and the broad array of topics are very important. There is a lot of diversity in this conference, and usually conferences like APTA do not present such a rich array of viewpoints. **Larwin** commented that this symposium's diversity and dialogue of viewpoints and ideas is very healthy, particularly for people like himself who are standing in front of the public and boards of directors and recommending sometimes million-dollar actions. Practitioners are held accountable, and it is a lot of responsibility.

Transit is a distressed industry. San Diego has grown its ridership 2.5 times over the last 25 years, which is a pretty good record. During that time, farebox recovery has gone up about 15 percentage points, and per capita ridership has also gone up. While **Larwin** stated that he is proud of the accomplishments, he is also concerned that mode share has gone down. While this conference has validated a lot of the efforts that San Diego has made, it also has forced him to think about how they can do their jobs better in transit. The challenge is to understand the various markets that previous speakers have mentioned, to design services to serve these markets, and grow our product. The industry has a challenge ahead and we cannot rest on any laurels gained over the last few years. That is just not good enough.

His second point was that we have to think differently about our markets. **Larwin** agreed with **Fielding**, that the industry must identify large markets and go after them, understanding their transportation needs and attitudes, and fashion services accordingly. But in addition, **Larwin** reported, San Diego's market segmentation surveys have found that attitudes are also shaped by geography. For instance, a high income resident in East County has different needs and attitudes than a high income resident along the coast. So a lot of the work San Diego is doing is related to market segments, attitude surveys, and where people live. About one sixth of all people in San Diego would never use transit, no matter what was done. And, there is another one sixth that strongly prefers using transit – regardless of how poor the service may be, they would still ride. But there is a large group in the middle two thirds of residents who would use transit if and when it can meet their needs. These residents base their decisions on three components -- whether the service gets them from point A to point B, whether it can do so quickly without long waiting times, and whether it makes them feel good.

Larwin admitted that agencies tend to miss out on the last component. Operators tend to put emphasis on the function of speed and reliability, and often forget about the customer's total trip experience. For example, we know that speed is important, but so is flexibility. Travelers in the two-thirds part of our future market need to have some flexibility in terms of geographical connections and time connections. They need to travel not just to downtown, but also to other activity centers throughout the region; and they need to travel not only during peak periods, but at various times of the day and night.

There is also sensitivity about the personal experience on public transportation. This large market (the middle two-thirds of residents) needs to feel secure, and needs to like its surroundings. These are areas where agencies must pay attention to detail. And fares are less important relative to the quality and type of service that you provide. Across categories of income, fares generally ranked low in priority. This is not to say that they are insignificant, but they are lower in importance than the total trip experience, its flexibility, and its speed. San Diego and the industry in general must pay attention to the whole trip experience, from the time a traveler leaves the door of his or her home, all the way to the time he or she arrives at the final destination.

To accomplish this attention to the whole trip experience, we need better land use connections, whatever the mode used to get to the bus stop or train station. We need better amenities to

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improve how the station looks and feels. San Diego has 5,000 bus stops in its metropolitan area and quite frankly they are not well maintained because it takes a lot of money. Real time information is also important, so that people know how long they will wait, and the status of the next bus arrival. If frequency of service can be reduced to ten minutes, riders do not have to worry about timetables, and waits are not perceived to be as significant.

And riders care about security, also. San Diego's two-thirds market is not comfortable riding with the people onboard, going through the communities they go through. We have to deal with that, because it is a reality, and one way is to give people a better feeling of security.

Third, although fares may not be a high priority, it is still a critical part of the experience. When fares are complicated, we lose travelers who do not want to feel embarrassed because they don't know the fare or cannot figure out how to use the machines. Agencies need to produce systems that are as simple as driving cars -- drivers go to the pump, take out a wallet and a card, slip it into the machine, fill up without caring how much the gas costs, and get back into the car without any confrontation. In this regard, the electronic fare payment system is the wave of the future. San Diego will have it in the next couple of years, but will retain its differentiated fare structure for different types of services because people who want quality services, such as commuter rail, will have to pay for it. But there can be discounting and market approaches based on, for example, times of the day, or weeks, or direction.

Fourth, **Larwin** said that San Diego has recognized that to give riders a better experience, the agency cannot do it alone, and must rely on partnerships. The agency can provide the service, but cannot shape land uses. So it is working with partners such as the North County Transit District, the San Diego metropolitan planning organization, and Caltrans. Local jurisdictions are also vital in shaping the land use component and designing communities with pedestrian climates. While transit agencies can influence and stimulate these developments and provide the transit service to serve these areas, they are not the ones to make those decisions. So it is about partnerships and they are complicated. But it's moving forward in San Diego, and the MPO is heading up the regional transportation plan update. **Larwin** read some excerpts of the plan:

It's a network of transportation services that connect our region, it is a system that is convenient, reliable for commuters, but also for those that depend on transit as the primary way of getting around, as well as for visitors to the region. Implementing this vision will make taking a trip using transit just as quick as taking one by automobile for many of us -- not all of us -- but many of us. The regional vision integrates transit into our communities and neighborhoods, and relies on local jurisdictions supporting transit-oriented developments that become the central activity areas around which housing, jobs, shopping, recreational opportunities are plentiful. Transit becomes woven into the fabric of our daily lives. Transit riders enjoy a superior walk environment, to the pleasant surroundings of the community stations.

Last, practitioners and managers often have to make tradeoffs, and there are competing transportation policy pressures. **Larwin** discussed two in particular -- the development function vs. the operations function. The development function requires practitioners to be optimistic about the future and think that they will be able to meet goals and visions. On the other hand, the operations pressures force managers to be realistic and practical. Managers therefore must, on a daily basis, respond to complaints, worry about where funding will come from, watch rising energy costs, and satisfy labor contracts. And then managers are in front of their boards of directors, saying there is not enough money to put out the new service we've been talking about next year, but we also want to do far more than we've done in the past. That is a tough thing for both management and the board of directors to deal with. On the other hand, you have to keep

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doing it. A lot of things accomplished in San Diego were because plans were already on the shelf that were well thought out and ready to go.

Another set of competing policies in transit is how we can operate like a business and still carry out social objectives. Transit agencies want at least a dollar return for every dollar spent, increasing farebox recovery, and more riders. On the other hand, we have to make sure that we have a happy labor force, that every part of the region has service within a certain distance to serve all taxpayers equally, and that there is service on Sundays because there are people who need to go to church. We have to have fare discounts for those who cannot otherwise afford transit, and all of these things work against operating like a business. It is a challenge, but one that is a real part of the industry.

In conclusion, the lesson is to not give up just because you can't accomplish something tomorrow. Public transportation can make a difference if it is designed differently. It is making a difference now in many of our metropolitan areas, but **Larwin** would like to see a more significant difference, where instead of carrying one to two percent of the mode share on a daily basis, his agency can get that up to ten percent. It can be different if it is part of the community development and if agencies are responsive to the different markets and the details. **Larwin** defines progress as net progress, which takes time. He reminded practitioners, managers, and officials that progress is often two steps forward and one step backwards; setbacks do not mean that the whole program is down the drain.

DISCUSSION

Martin Wachs, UC Berkeley, commented on several speakers' points that simplicity of fare structures was critical for maintaining ridership. **Wachs** stated that there is no evidence that transit users cannot cope with complex fare structures, as long as the fare structure is somewhat transparent and clear to the user. He challenged the notion with an example of how consumers face enormous complexity in airline fares, yet make decisions about when and where to travel and which airlines to use. Transit operators that put off the possibility of investigating different fare structures on the basis that their users can only deal with simple structures are making a big mistake that damages their marketing capability.

Wachs then commented that it seems that technology is not the primary obstacle for new innovations in fare pricing and structure, but more important is the difficulty of forming inter-organizational agreements. The San Francisco Bay Area, for example, has been trying to implement an integrated fare structure program for a very long time, and the process approximates the Middle East peace talks. Similarly, in instituting many of these university pass programs, the universities believe the transit operator is soaking them, students say administration should pay for it, administration says it should come out of parking fees, parking administrators say it should come out of student fees, etc. **Wachs** asked **Fleishman** to offer some lessons or insights about the ways to ease the burdens of institutional barriers. Are there models or success stories that can help institutions do a better job in partnering efforts?

Fleishman agreed with **Wachs**. A large part of the San Francisco issue is that 26 agencies are trying to agree on something. While they have, in the end, come to agreement and have decided on a process of implementation, not every agency completely agrees to the plan. They all agree in principal to participate, but struggle over the allocation of revenue. Los Angeles and Washington will be dealing with these issues, and will consider a clearinghouse to deal with collecting and allocating the revenue based on who is collecting the revenue and who is serving the trips. It is also an important and difficult issue because the 26 agencies all have different equipment and different replacement cycles. One way to deal with that is to have someone come in and agree to

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pay for everyone to upgrade their equipment. And there are a number of models. Hong Kong has one of the first regional smart card systems. Six agencies formed a consortium – a separate entity – with a vendor.

Larwin also responded to **Wachs's** comment; he agreed that complex fare structures are not bad, but they are especially problematic for the occasional user who may face problems with it. San Diego has a distance-based fare structure, and the matrix of fares is 25X25. There is also a single basic fare, and other ways of putting together a fare package. It is healthy, but San Diego goes through a simplification process and a new marketing restructuring every couple of years.

Greg Harper, AC Transit, urged participants and panelists to remember that users of transit systems, as seen in previous sessions, tend to be poor. From AC Transit's perspective, about 60% of the riders earn under \$10,000. And smart card systems are great for multiple applications, but a lot of the riders do not even have bank accounts. Also, some resistance to implementing smart cards is purely mechanical, but also some resistance is how quickly riders can adapt to the new technology. AC Transit is also moving toward a proof-of-payment system. **Harper** asked whether proof-of-payment makes the smart card idea even more senseless, or if it presents conflicts with smart card development and implementation.

Fleishman responded that proof of payment is more difficult to do with electronic payment, by the very nature that you have to prove that you've paid for a trip. If you have a fare card without anything written on it, the inspector can't just look at the card and tell. So you need another step. You either must let the rider use the card to buy a proof of payment ticket, or you have to provide your fare inspectors with hand-held readers that are capable of reading the card to say that the card is a valid monthly pass or fare has been deducted. It's a little trickier.

Larwin added that many of users in San Diego cannot use the smart cards, and existing standard fare boxes will always exist. The two thirds they're trying to go after that is not a routine user of transit is a market that will be much more adaptable to smart card technology.

Elizabeth Deakin, UC Berkeley, has been doing research on low-income families' use of technology, and she is not as easily discouraged. Low-income people use bankcards, and phone cards. And the way they actually pay for a lot of phone cards requires that they navigate through very complex fees and purchasing options. Sometimes they don't even have phones in their homes and they can navigate through the wide variety of phone cards available. Many are immigrants and use international calling cards to call their home countries, and this is a very complex decision process. **Deakin** urged practitioners, planners, and researchers to be smarter about how we make technology available and not just one particular way of providing this technology.

Robert Behnke, CO-WIN, Inc., described a distance-based smart card system in France in the 1980s. Ridership unexpectedly jumped up with the new policy, and through market research, the agency found that people who only rode for short distances under a flat fare policy did not find the bus to be a good value. When the system converted to a distance-based fare, there were many more short trips. Also, in Scandinavian countries there is a lot of development in wireless Internet, that allows people to charge a Coke or a candy bar from a cell phone. It is called an electronic wallet, and is a function of a wireless phone. Is any of this new development taking place in the US?

Fleishman responded that he has not heard of anything like this in the US. Europeans refer to this technology as M-commerce, or mobile commerce. In Finland, it is applied to transit, as well -- riders can order a transit ticket in advance by using a cell phone or a PDA device. It also allows

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riders to check on the schedules and availability of seats. Upon boarding, the rider displays the phone ticket.

Behnke commented that one possible way to stimulate this kind of development is to pass control to Caltrans to develop it from a state-oriented integration. If we continue to operate based on local control, we cannot have this kind of large-scale integration.

Jeff Hobson, Bay Area Transportation and Land Use Coalition, asked if anyone has studied the income effects of the various types of fare structures? BATLUC works with low-income communities and particularly welfare recipients who are not getting free bus passes from their social service agencies. We hear that they pay the single cash fare everyday because they can't or don't perceive being able to afford the monthly pass. So fare structures that give discounts for up front purchase of multiple rides may disadvantage people who operate on a cash and day-by-day basis.

Fleishman agreed that this is a serious concern. For those low-income groups that can afford a pass, it behooves them to buy multi-passes because they ride regularly. Some agencies have responded to the concern about the lump sum payment obstacle by offering one or two-week or one week passes or day passes to give people a variety of fare options. For example, Baltimore switched from a transfer policy to a day pass, and it quickly became the most commonly used fare option. With the new fare media and stored value, this also allows people to load as much as they can, whether it is two dollars or more. The issue is at what price does the rider receive a discount -- would it be when ten dollars is loaded, or twenty?

SESSION 7: TRANSIT AND LAND USE: EVALUATING THE CONNECTIONS

Reid Ewing, Research Professor and Acting Director, Vorhees Transportation Center, Rutgers University

Anastasia Loukaitou-Sideris, Professor of Urban Planning, UCLA

Therese McMillan, Deputy Director of Policy, Metropolitan Transportation Commission

Ellen Greenberg (Commenter), Director of Policy and Research, Congress for New Urbanism

Jonathan Levine (Moderator), Associate Professor of Urban & Regional Planning, University of Michigan

Jonathan Levine pointed out that past empirical research has not fully explained the connection between land use and travel behavior, because it has been missing the underlying theory of why one does not see more transit-oriented development (TOD). Another theory that we do not see TOD because of lack of market demand implies that planning interventions may be required to bring about alternative development. This raises the question, "can we justify planning interventions to force the market on the basis of proven benefits in travel behavior?" Interventions based on this core theory tend to use regulations and subsidies to compel TOD. This also implies another rationale that transit-oriented developments provide not only transportation benefits but also expand the range of effective choices in land use and transportation environments for individuals and households.

Jonathan Levine stated that he expected the presentations in this session to ask what is impeding transit oriented development, and what are modes of intervention which can be undertaken on the part of planning agencies and the public sector to bring about transit-oriented developments. **Reid Ewing** will review empirical literature to interpret why we see impacts at some places but not others. **Anastasia Loukaitou-Sideris** will address what impedes transit-oriented development and what it takes to implement alternative development in existing urban city areas. **Therese**

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McMillan will address what the public sector can do particularly at the regional level to induce and encourage transit-oriented development.

Reid Ewing started his talk by introducing STPP, the Surface Transportation Policy Project, a transportation reform advocacy group. STPP has consistently advocated for investment in more transit in its studies. It has authored reports on the containment of sprawl to preserve quality of life. Ewing stated that transit investment is critical for the formation of strong urban cores to contain sprawl and the dispersion of jobs and housing.

STPP's recent reports mentioned the "3Ds" -- density, diversity or mixing of land uses, and design. All three are potentially important for people's travel choices. Ewing illustrated these ideas with some transit-oriented development case studies. Madison, where we can find wonderful walkable streets, has very low bus mode share even though it has a large student population. But this case study shows that it takes more than 3Ds and what may be missing.

Changing the design of communities does not necessarily significantly increase transit mode share. A survey was taken in the area of the Orenco LRT station near Portland, maybe the best suburban TOD in the U.S. This area, which is characterized by a town center, mix-used development, relatively high-density housing, commercial uses, pedestrian-friendly design, and streets with traffic calming measures, shows 11 percent of working residents in the area take a LRT commute ride at least once a week. This is not very good. Another example is Hillsboro, in a suburban area in Washington County, which has not been very successful, either. Here, the municipality tried to implement a lower parking ratio for the development of multi-family housing.

A study of Metro Square, a New Urbanist infill project in Sacramento, was conducted by a group of planners and engineers to look for environmental benefits. The context is much better in this project than at Orenco. It is only one mile away from the city center, has a higher density, mixed-use development, everything is in walking distance, it uses a pedestrian-friendly design, and provides transit services within 10 blocks. Although people walk for non-work purposes, transit mode share in work trips is just little above the regional average. This shows that a limited transit system does not do well with TODs. Further, while rail is the mode of choice for choice riders, there is not a real concentration of activity around the stations.

In contrast, there is Bethesda, Maryland, in which one can see a combination of proactive transit planning, high density, mixed use, pedestrian-friendly design, limited parking, and seamless transfers at Metro stops to buses. In 1997, Bethesda had transit trips of 17 percent in work trips.

In a paper to review 50 recent empirical studies on the relationship between travel and the built environment, **Cervero** and **Ewing** found a clear relationship among density, transit use, and mode share after classifying communities into pedestrian-oriented and auto-oriented, the presence of transit, and others factors. It also found mixed-use is less important for transit use than density. Density, diversity, and design were found to have effects on vehicle trips and vehicle miles traveled, controlling for socio-economic factors. In addition, regional accessibility was found to be more important than high density. Their study concluded that it is necessary to take into account many factors such as trip characteristics, socio-economic characteristics of travelers, and characteristics of both origins and destinations in terms of transit-friendliness, etc.

The basic conclusion of Ewing's talk was that the "3Ds" are important for successful TODs. But, regional accessibility and transit accessibility are also very important.

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Anastasia Loukaitou-Sideris started her talk by pointing out that the proposal of an alternative way of life supported by higher density pedestrian friendly TOD is missing a discussion of how such a transformation can take place within the existing urban context, and what are necessary antecedents—economic, environmental, institutional, and political—for such transit neighborhood development in America’s inner cities. The aim here is to explore and identify these antecedents beyond urban design prototypes. Design is important, but just as important are incentives, institutions, public-private partnerships, community participation and endorsement, physical and regulatory innovation, timing, phasing, deal-making, and inter-agency coordination. All of these are messy, but are important realities that make a project.

By way of example, she discussed her study of the Metro Blue Line in Los Angeles County, which connects downtown Los Angeles and downtown Long Beach, running through many depressed areas or neighborhoods. When the Blue Line was still at a conceptual level, it was perceived as a stimulus for economic development and central city revitalization.

It has been 11 years since it was built, and it is good time to evaluate the impacts on immediate communities along the line. The reason for studying an inner-city line is that it is exactly there where we find formidable social, economic, and institutional barriers that continue to frustrate expectations of development around transit stations. Many of these obstacles are rooted in the social ecology of inner-cities that have suffered from a long history of disinvestment, neglect, fear of crime, drugs, gangs, and violence. These characteristics dominate the public's perception of the inner city. Important questions are: “Is there a future for transit villages along the inner city transit corridors?” and “What would it take to make these corridors become assets for communities, and promote growth and development around inner city stations, in the face of such structural problems?”

Since the Blue Line utilized an existing right-of-way to reduce costs, there was not room to identify desirable land uses, urban form characteristics, and population concentrations. Ostensibly, the physical presence of the new light rail was considered sufficient in itself to attract private development. In the 11 years of its operation, ridership has doubled, but a key question is whether it has created any change in growth and development around the stations along its line.

In her survey of neighborhoods around stations, **Loukaitou-Sideris** still found quite a lot of empty fields and classical inner-city decay around stations, clearly showing that the New Urbanists’ vision of vibrant station neighborhoods with a mix of residential and commercial services has not been realized here. Stations suffered from an absence of desirable amenities. In addition, the Blue Line stations have not spurred the anticipated development.

To assess the problems and prospects, **Loukaitou-Sideris** conducted a survey of 25 TOD experts from public agencies, the private sector, academia, and community groups, and asked their opinions about, “What are the most important pre-conditions for successful TOD in the inner-city?” Experts thought the most important pre-condition was the existence of a proactive planning department or development agency that supports TOD, offers regulatory assistance, implements land use controls and streamlines the permitting process. Of almost equal significance was local government support in the form of financial participation in and commitment to TOD. Other factors include public-private partnerships with both partners knowledgeable about their roles, and community support for higher densities, mixed use, and a pedestrian-friendly streetscape.

However, experts were quick to point out many constraints – lack of interest by the private sector for investing in inner-cities, the absence of a market demand for inner city space within the range of costs at which it is possible to develop TODs, the competitive disadvantages of the inner city,

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the difficulty of competing for development money, preconceived prejudices, the lack of financing, and redlining by financial institutions.

So some of the inability of the Blue Line in realizing its promise can be viewed not as a lack of skill or interest of planners but as a lack of pre-conditions. Although using the existing right-of-way saved money, it brought the line to the back lot of the communities. As one approaches some of the inner-city stations, the density paradoxically gets lower. Some of the stations are inaccessible due to the absence of east-west bus lines and pedestrian unfriendly street designs. The fact that the land is quite expensive precludes development by non-profit organizations. Many regulatory barriers—antiquated zoning and subdivision regulations, and the permitting process — add significantly to the cost of construction. There are no lower parking requirements for affordable housing development around stations. There is a general lack of institutional commitment – a number of cities did not choose to work with the MTA. There is a lack of community involvement and participation – many of the community groups did not participate in the planning stages.

Experts said that in order to counteract barriers for inner-city development, we need a way to induce private sector interests. Local governments need to assume part of the investment risk by giving incentives such as rent subsidies for developers and retailers to locate in the inner-cities. Experts also felt that if the cost of development were lower, it would attract more developers. The role of the public sector was seen as crucial in putting together a program of land assembly, land write-downs, and authorizing necessary regulatory assistance.

To reduce the competitive disadvantages of inner-cities, the public sector should create a more balanced playing field through land-use policy and other pricing mechanisms, so that TOD can become competitive with ex-urban development, which is perceived as having lower risks and costs. Finally, ensuring financing may be most important—redlining has historically plagued inner city areas, even though banks now have requirements to show lending in low-income communities. Another financing source comes from local housing assistance programs that can be targeted to TODs.

Loukaitou-Sideris' discussion demonstrated that there are many pieces that need to be in place for TOD to succeed in the inner city. While local communities and the private sector are certainly actors in the process, it is really the public sector that is asked to take the lead, set the stage, develop policies, and offer important subsidies and assistance to support the creation of TOD in the inner city. It remains to be seen if TOD will become a viable option for community enhancement and positive change in America's inner cities. But certainly, it is not as easy as some of the New Urbanists say.

Therese McMillan talked about the Metropolitan Transportation Commission's Transportation for Livable Communities (TLC) program, which includes transit as a key element. She described the TLC planning and capital programs, gave examples of funded projects, reported on the new housing incentive program (HIP), and shared lessons learned.

While the 25 year regional transportation plan addresses the issue of transportation and land use, several agencies – including the MTC, Association of Bay Area Governments, local Air Quality Management District, Bay Area Conservation of Development – are working to get a better handle on macro level relationships between land use developments and transportation investments. These issues deal with smart growth strategies, regional inter-agency collaboration, and regional accessibility.

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The TLC program works on grants for neighborhood transportation projects. Several key features of the TLC philosophy are: 1) community participation, 2) on-going community development and redevelopment that integrates transportation and development into an overall planning approach, and 3) project design that encourages bike, pedestrian, and/or transit trips.

The planning grant program provides funding for community planning, outreach, and conceptual design for transportation projects related to community development. Grants range from \$5,000 to \$50,000, and TLC has funded about 45 projects at \$1.3 million to date. The planning grant program is important because good planning produces good projects that can receive capital grants. In this program, the capital grant program is far more substantial, as the average amount of funding is \$9 million a year, coming from three federal funding sources under TEA-21: the Surface Transportation Program (STP) funds, congestion mitigation and quality funds, and transportation enhancement funds.

McMillan described the 16th Street BART Community Plan as an example of a project that started out from a planning grant and was followed by a capital grant. This particular station is in a dense area that had poor planning design. While there is high transit use at the station, the community was concerned about crime and vandalism. Lighting in the area was not conducive for other activities around the station, such as vendors. Benches, trees, and other amenities that could allow this space to be more like a community plaza did not exist in the area. The station received a \$25,000 planning grant for nine months of planning, which involved over 100 residents, business owners, community organizations, etc. who pulled together a design that was different from the previous military-looking design. Subsequently, they received \$1.7 million in capital grant to put these improvements in place.

Another example is the Acorn/Prescott neighborhood, a very low-income community in West Oakland that despite its high level of transit dependency did not have transit access. A \$50,000 planning grant helped develop better connections between shopping centers in downtown Oakland and the BART station hub, to solve circulation problems that were endemic to the original design. Nine hundred units of renovated housing in the neighborhood is under construction, as is streetscape design for better lighting, more trees, and wider sidewalks.

With the Ohlone-Chynoweth Commons project, low-income housing programs and non-profit organizations are working with the Santa Clara VTA to develop new station designs for the upcoming new light rail line. Downtown Napa also is an example that there are important improvements that can be made in suburban neighborhoods as well as in inner cities.

Housing incentive program (HIP) is a new program, and is in response to challenges of increasing housing rather than improving neighborhoods. Funds of \$9 million are set aside for this program from the basic TLC efforts. It involves transportation funds provided on a per unit basis for housing projects that are within one third of a mile to a transit stop. **McMillan** continued, however, that these programs create incentives for local jurisdictions to develop more dense housing than if the program were not available.

McMillan shared some lessons from TLC. This program takes a lot of time mainly because it involves communities. Institutional relationships become extremely critical. Without all of the transit operators, public work departments, planning departments, and usually city councils on the same page, these projects cannot succeed. It is therefore also critical to have local champions stick with a project through the efforts.

Ellen Greenberg pointed out **Reid Ewing's** talk about the influence of land use on travel and transportation, and **Loukaitou-Sideris's** talk about the influence of transportation investments on

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land use. **Greenberg** commented that even within a small group of people in a small amount of time, we have heard two opposite sides of the same coin. These two presentations showed that neither land use techniques and strategies nor transportation investments can surmount fundamental obstacles when projects incorporate design features that promote automobile trips. They cannot trump the regional location issues. Regional locations are such a dominant force in people's travel choices that the best design project at the wrong location does not affect travel choices. Similarly, a very effective transit investment does not surmount inner-city conditions that make it so difficult to stimulate investment.

Greenberg made a few additional comments about the presentations in this session. First, **Ewing's** and **Cervero's** literature reviews showed relatively big efforts for small results in travel behavior changes. This shows that we need to choose projects based on a whole set of objectives instead of just assuming that they are going to change people's travel behavior. She advocated designing and approving projects based on other factors such as market demand and land use efficiency. The Blue Line problems highlighted many challenges for TODs. The good news, however, is that the Blue Line has a large ridership. It is important on both the development side and investment side to continue selecting projects based on a whole range of objectives. Working along different dimensions to achieve multiple objectives is the essence of smart growth. We need to think about a very long time frame for realizing true potentials of projects. Early studies showed that BART stations, after ten years, did not have much land use impacts. Now, after 25 years some very significant developments are visible.

Greenberg commented that urban features at the project level make relatively small impacts on people's travel behavior. Instead, we should think about urban design for regional accessibility. Regional accessibility depends on intensity, density, and concentration of employment and residential uses. **Greenberg** pointed to **Fielding's** discussion about a threshold of area residential density. We need to use our urban design skills to develop regions with high enough densities to support transit services. She urged participants to think about our ability collectively, including both the public and private sectors, to develop places that people like, and where land can be used more efficiently. Making them more urban will also allow us to serve them more effectively with transit and walking.

DISCUSSION

One participant asked how communities could get financing to encourage development. **Loukaitou-Sideris** mentioned a housing study that found quite a few empty parking spaces in low-income neighborhoods. Doing studies such as this can persuade developers that they spend too much money for unnecessary parking lots. **Don Shoup** added that a simple solution is for cities to eliminate the minimum parking requirement.

Ewing responded that if a city is serious about promoting walkable, transit-oriented downtowns and neighborhoods, it should set the parking ratio a little differently. For example, if a city does not want to completely abolish minimum parking requirements, it can merely lower the parking cap. Lower ratios are set around station areas, and as we move out, the ratio goes up to some reasonable number. Another possibility is that the public sector can get more actively involved in providing parking in shared parking arrangements.

One participant asked to what extent the Gallery Place Station in Washington D.C. had challenges that were similar to the development presented in **Loukaitou-Sideris's** research. **Ewing** responded that there are commonalities in terms of the time frame needed for development to take place. Gallery Place did not see any development for 20 years. All of sudden, someone figured

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out that there was very high regional accessibility to that point, served by three lines. Developers in that area said that once one developer took the first step, others came soon afterwards.

Hobson pointed out the similarity between the lack of development along the Blue Line and the lack of development along most of BART stations in the Bay area. The study by **Cervero** showed that there has not been lot of commercial development with the exception of downtown San Francisco and Oakland. Currently, there is potential for some development, and a study in ten more years may show good results. In contrast, we see that Washington D.C. with the Metro System has done more development than has BART. So it seems that it is not just time but also efforts. So what is the difference?

Loukaitou-Sideris stated that it is probably true that some development will occur in our lifetime if we wait. She agreed with the urban design visions that were discussed, and emphasized that economic incentives are very important from the beginning. One has to think about the kind of subsidies needed for a small business to locate in inner cities. Developers have some serious concerns about economic opportunities, so there needs to be quite a lot of proactive engagement of the public sector to make it happen. It is not just the time frame, and an “if you build people come,” attitude. If it does happen under these circumstances, it is probably coincidental.

Ewing stated that no one has done as good of a job in suburban planning as Montgomery County. Montgomery County has a good planning department and has produced many success stories. Partnerships between public and private sectors, which finally happened in the case of Gallery Place, are always important. It is good for the public sector to take a more proactive approach early in suburban development.

SESSION 8: GREEN TRANSIT: TRANSIT AND ENVIRONMENTAL QUALITY

Joanne Freilich (Moderator), Director, UCLA Extension Public Policy Program
Tom Cackette, Chief Deputy Executive Officer, California Air Resources Board
Mike Davis, Principal, Environmental Planning Group, Jones & Stokes, Oakland CA
Madelyn Glickfeld, Assistant Secretary, California Resources Agency
James Ortner, Manager, Transit Technical Services, Orange County Transportation Authority

Joanne Freilich introduced this session of the symposium. Environmental quality issues sometimes are subsumed under the discussion about transit and land use, but they are actually a whole subject in and of themselves. This session is designed to explore two major themes: The first is the significant problem of air quality, and in this context panelists will discuss green transit and its implications for air quality. The second theme explores the other aspects of the physical environment that often do not receive as much attention. This includes relationships between transit and natural habitats or open space as well as water quality, noise and visual concerns.

Freilich introduced the panelists for this session, and explained that this session would be run in a question and answer format, rather than as individual presentations.

Freilich described how transit historically has been used as a transportation control measure (TCM) to improve air quality by moving people out of cars and into buses, rail and other forms of transit. However, we now have cars that are much cleaner. How much emissions reduction in air quality improvements can we expect from behavioral shifts from the automobile to transit? Is that the best way to get emissions reductions benefits?

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Tom Cackette agreed that cars have been getting cleaner for a long time. A car that sold in 2000 had less than 1/3 of 1 percent of emissions that came out of the cars in the 60s, and electric cars are pushing the emissions to zero. That sets a real challenge for the use of diesel engines, which have much higher emissions and which have not been controlled on as tight of a schedule as gasoline engines. Even though a diesel powered device (train, bus, or ferry) may carry a lot of people, the emissions can be quite high, depending on the pollutant you're talking about, the age of the vehicle, and the degree of emission controls they have.

Buses are meeting the same type of downward trend in emissions, but cars happened much faster and much earlier. So to answer the question fully, we must talk about the pollutants involved. ROG is unburned fuel, or hydrocarbon emissions, one of the two constituents that makes summertime smog. For hydrocarbons, diesel engines have always been quite clean, and they continue to get lower. So taking the bus is still a good thing for hydrocarbons.

For particulate matter (PM) emissions, the story is a little different. Car gasoline engines do not emit much particulates. You would need to attract 20 or more new riders (who would normally drive) per bus before you break through the particulate threshold. PM is probably the pollutant with the most severe health impacts with lung problems and premature death of cancer. This is not good news for the current bus. Fortunately, there is a technology becoming commercially available, called particulate filters, and they are extremely efficient, like catalytic converters in that they can remove about 90-95 percent of the black soot and invisible soot coming out of buses. Particulate filters will be on all 2002 model year buses, which will probably be used and procured by 2003. At that point, we can start breaking even with the car emissions with about five people per bus switching from their cars to using buses.

NO_x is the biggest challenge for diesel engines and buses. A current bus would require 20 discretionary people per bus to equal the NO_x emissions generated by the current fleet of cars (composed of both new and old cars). NO_x emissions contribute to ozone and there is concern for year-round smog. In 2003, bus emissions will be cut in half, and then each bus would require about 7 discretionary people to break even with automobile emissions. The 2007 model year buses will have both NO_x and particulate control, and will then be competitive with automobile use.

At the same time, however, car fleet emissions will be lower as well, as old cars are retired from the fleet and replaced by new cars. Although this places some challenge on buses, buses still come out looking pretty good.

James Ortner reported that with the passage of the Clean Air Act in 1970, there was a naive goal that by 1975 we could achieve clean air. In Los Angeles, there were draconian measures to control personal and travel behavior, such as gasoline rationing, priority treatment for carpools and buses, surcharges on parking, and management of parking supply. When the Clean Air Act was amended, Congress and the politics of the time removed the authority of the EPA to restrict personal behavior. During this period in the 70s and 80s, states basically ignored transportation planning as a strategy in their federally-required attainment plans. In the 80s, Southern California focused on stationary source cleanup, and toward the end of the decade, many people were highly critical of the lack of focus on the mobile sources. They began to build pressure at the air districts, and by the end of the decade regional transportation plan strategies had the intent of affecting air quality. The California Clean Air Act was passed in 1998 and reflected a lot of those strategies.

At the federal level, the Reagan administration in the 80s made little effort. However, in the summer of 1988 there was a tremendous smog siege on the East Coast, and for the first time people outside of California were demanding revisions to the air quality laws. In 1990, the Clean

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Air Act was amended and with it came stronger powers to control measures and to reduce emissions through transportation. Therefore, many of Southern California's efforts that began in the 60s started to take hold nationally in the 80s and 90s.

The Manzulo Amendment to the Clean Air Act occurred in 1995, which eliminated ridesharing as a federally-mandated strategy. This shows how both data and policy moved away from the expectation that behavioral solutions would get the emissions reductions benefits hoped for. This movement eventually began to focus on the actual problem, which was the diesel engines. And among the environmental community there was a focus on the direct source of the pollution which was the engine and heavy duty vehicles.

Freilich summarized that more air quality benefits are resulting from technology itself, rather than from behavioral shifts. **Freilich** asked **Cackette** to discuss air quality technology advances for buses, such as CNG engines, cleaner diesel engines and cleaner diesel fuel. She asked whether cleaner diesel buses or alternative fuel buses gives more emissions benefits.

Cackette admitted there is no simple answer. The answers vary depending on the time of evaluation. Currently, natural gas buses are cleaner than diesel. However, when emissions controls for NO_x and particulates are placed on diesel, they become 90% more efficient. This is coming in 2007, when state regulations will require such controls, at which point differences between controlled and natural gas buses will be insignificant.

Ortner agreed, but stated that it is a problem for operators. OCTA was mandated by the South Coast Air Quality Management District, and a decision was made to shift to natural gas. It took the strategy that if it put in the new facilities, they would also be compatible if the district went to a hydrogen-based fuel. Therefore, when they started they tried to take a longer-term approach. However, the weakness in that strategy was that while they prepared for the fuel itself, it is much more difficult to pre-plan all the support needed to transition quickly to a new fuel. Now, the problem is dealing with bus manufacturers, and getting them to build a good natural gas bus is a severe problem. There are issues about the durability of the equipment itself, and while the engine manufacturers spent decades developing the diesel engine, they only took essentially a decade to develop the natural gas engine. So that means incidents and failures, which result in entire fleets being grounded when a turbo charger fails, or when buses catch fire.

On the other hand, OCTA buses are cleaner. While it was able to negotiate a good fuel contract, paying 84 cents per gallon diesel equivalent, there is still great uncertainty about what its long term maintenance costs will be, because the equipment is still so new.

Cackette reported that in producing greener buses, there are some other promising technologies, such as turbines and microturbines, for example, which potentially makes diesel extremely clean. Fuel cells also have made advances, but they still cost about \$1.5 million per unit, out of the reach of bus operators.

Freilich asked about the difference in price between CNG and clean diesel buses.

Cackette answered that clean diesel buses cost about \$290,000 and a CNG bus about \$330,000. In earlier years, the difference was bigger, and agencies were eligible for grants to make up that difference. But now that the clean diesel engine costs are increasing also, the grant money that we once relied upon disappears. So while the \$40,000 increment will still be there, the amount of grant money disappears. Additionally, while the MTA used to sell its emission credits because the CNG buses were much cleaner than required, that option will be taken away as well. For agencies

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that bought new and expensive equipment, they had some regional air quality agency assistance, but this is disappearing, and the gap in the price of the buses has not narrowed.

Freilich asked whether these cost differences change agencies' decisions between CNG and clean diesel fleets.

Ortner reported that a lot of the smaller municipal operators in Southern California, for example, are looking at hybrid technology to minimize infrastructure costs. By looking at hybrid, there is less investment in energy storage and CNG compressors, especially since many of these new systems do not have the warranties available for diesel engines. San Francisco Bay Area agencies are holding on to diesel based on the argument that the costs are too high and funds are too scarce. Southern California, however, had no choice.

Cackette added that the transit bus fleet is currently 20% CNG and 80% diesel, but this is changing rapidly. **Cackette** predicted that by next year the fleet composition will be 30% and 70%.

Freilich asked **Cackette** to discuss and explain the Urban Public Bus Fleet Rule that was enacted by the California Air Resources Board last year.

Cackette explained that the rule requires transit buses to push toward the zero emissions goal. First, beginning next summer buses are required to use diesel fuel that is much lower in sulphur than is commercially available. Agencies also are required to begin retrofitting all existing diesel buses with the particulate filters by January 2003. New engines must reduce particulate matter by 90% by 2002, and reduce NO_x by 50% by 2002, 88% by 2004, and 99% by 2007. Additionally, 15% of all new bus purchases for diesel path agencies starting in 2008 (or CNG fleets in 2010) must be zero emission, or fuel cell buses. In other words, there are two paths -- either the diesel path or the alternative fuel path -- and their schedules differ but eventually end up in the same place.

Freilich was concerned that if buses represent 3% of the heavy duty vehicle fleet, and the remaining 97% are largely composed of trucks, why are policies focusing on cleaning buses and not trucks?

Cackette provided several answers. There are a number of technical, air quality, public health, and political reasons for focusing on buses before targeting trucks. Political reasons include the fact that government helps pay the price of buses, so it can push for emissions technology on this front. From a health standpoint, much of the bus traffic is concentrated in heavily populated areas such as downtowns, urban corridors, and neighborhoods; additionally, particulate exposure caused by buses is pretty high, and exposure at localized levels causes cancer concerns. Finally, all the trucks will eventually be required to reduce emissions, but on a different schedule (about four years later). However, all new buses and trucks will follow the same schedules for NO_x and particulate matter.

Freilich asked how the current energy crisis affects plans for alternative transit vehicles, and for rail operations.

Ortner felt that the better question would be how transit or rail affects the energy crisis. There is no definitive answer to whether alternative fuel use on transit (buses or rail) will be affected by the energy crisis, but the situation can only be positive for greater use of alternative fuels. The Legislature has charged the Energy Commission to put together a set of recommendations on reducing the use of petroleum in California. Reductions can come in two ways – either by

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conserving petroleum, or by expanding the use of alternative fuels. Refineries in California operate at near 100% capacity, and in addition, the state imports energy. There are efforts to define some growing sectors of alternative fuel use, and transit is one place where that makes sense.

Madelyn Glickfeld added that any improvement to air quality is also an improvement to water, because what comes from the air ends up in the water. NO_x turns into nitrates, and lead flows downhill toward streams. Panelists have discussed the relative air quality benefits of buses, but **Glickfeld** asked them to comment on the benefits of light rail and inner city rail on a per passenger basis between rail and buses, similar to the comparisons made between buses and cars.

Cackette explained that commuter rail, which uses a locomotive pulling passenger cars, is clean except for NO_x . The capacity and numbers of passengers being carried must be factored in, and then compared with the emissions produced if these riders drove or rode the bus instead. While **Cackette** did not have these figures available, he did respond that regardless of the figures, if we pursue cleaner fuels or if the occupancy of the trains increases, rail would be more environmentally sound than it is currently. Again, the calendar year is also important. The emissions standard today is 5.5 grams of NO_x for a train and 4 grams for a truck, but the ultimate benefits depends on the number of passengers in each mode. In the future, however, trains will stay at 5.5 grams because the federal government is not pursuing lower standards, while buses are being reduced to 0.2 grams of NO_x . **Cackette** guesses that buses will have more emissions benefits.

Light rail, which typically is electric, has a distinct advantage because California has an extremely clean generator system. Additionally, the state is on a clear path to overcome the electricity crisis, so **Cackette** sees no reason to shy away from electricity as a clean fuel in the future, regardless of mode.

Freilich discussed the numerous EIRs and EISs prepared for transit projects in California and throughout the country. She asked panelists to discuss some of the positive and potentially negative impacts that policymakers and others should be aware of when they're considering projects.

Mike Davis responded that it is difficult to make blanket statements about positive and negative factors. Many projects are touted on their air quality benefits, and it is difficult to have a standardized formula for evaluation. Sun Belt cities often argue that light rail transit has exponential capacity compared to adding a freeway lane, but HOV freeway lanes can add other buses. Skinnier rights of ways for an additional highway lane impose lighter burdens on the land, but since rail projects are in traditional rail corridors, generally there is less community relocation and disruption with a rail corridor. In relation there are stronger benefits for transit oriented development over just transit corridor projects.

Additionally, the EIR/EIS process created an advocacy community for historic preservation in Sun Belt cities that did not exist before. This has come up with New Start projects in Houston, Dallas, and San Juan, Puerto Rico.

Glickfeld added that there are three other categories beyond air pollution which have not received much needed attention in bus, light rail, and heavy rail projects -- water pollution, soil, and groundwater pollution. Bus yards where buses and trains are stationed are a real problem, because the bottom of vehicles are empty, and whatever drips out ends up going into the ground and eventually into water. There are also sources beyond the engine itself -- maintenance of vehicles and the residue left over after maintenance. **Glickfeld** urged participants to think about pollutants

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that not only come from the engine, but from other parts of the vehicle as well. Experts still do not understand the degree to which tire dust, brake pad linings, and lubricants contribute to water and soil pollution. The California Resources Agency is exploring converting the Chinatown and Taylor Yards in Los Angeles into state parks. Examples like these yards have shown that there are major challenges to dealing with non-point sources. If we are moving toward more buses/trains we have to pay attention to not only the fuel but also the industrial design of the vehicle itself to minimize other kinds of pollutants.

Davis added that projects that generate attention and mitigation efforts have been focused on the physical effects on communities, and not natural resources effects, because most projects tend to be urban projects. For example, a Santa Cruz study on a rail project conducted a few years ago was one of the very few rail projects that **Davis** has worked on that dealt with biological resource issues. Typically, most projects deal mostly with noise and vibration concerns in developed areas, or visual issues and aesthetic concerns, particularly with LRT in Phoenix, Houston, Dallas, and Las Vegas.

Another under-examined issue is effects on low income communities and equity. There is often a trade off, particularly in New Start systems, between choice riders who can help with fare box recovery and who voted for the projects, versus the communities that look on these systems as economic development components. Particularly in Dallas, the community concerns were not about traffic and stations, but about wanting to build a rail car assembly facility in the neighborhood for economic development.

Glickfeld contended that transportation agencies will see new challenges from a resources standpoint. **Glickfeld** explained that she is working with the California Legacy Program on a statewide natural resources investment strategy that will identify key places and high priority areas for conservation. Riverside County is extremely important as a model for incorporating both natural resources and transportation into its general plans. There, Caltrans works with resource agencies and regulatory agencies to develop new transit corridors. This is a remarkable step forward because conservation is usually regarded as something separate from the general plan, and can be thrust aside as people yield to the development process. Another development that has been critical for statewide conservation planning is the coalition of organizations that is identifying missing links for migration. These are places where landscape linkages for species could be threatened by new road alignments or development, and places where there are missing linkages or choke points. The largest single problem is highways. Fifty-seven percent of all the missing linkages throughout the state were caused by highways. The solution is to plan habitat conservation and transportation together.

Freilich asked panelists to comment on the planning, regulatory, and mitigation actions they think would be helpful in reducing negative impacts of operations/development of transit, and also the things that would make positive contributions to the environment.

Davis expressed hope that the EIS/EIR process will be streamlined. While the highway system requirements are much more defined and the level of analysis is very good, **Davis** hoped that the elements could be integrated so the community can better understand the tradeoffs when making any decision. **Davis** agreed with **Glickfeld** that the State Resources Agency participation should be integrated into the planning process. **Davis** reported that as an agency or a project sponsor, it is often difficult to involve other agencies unless there is a regulatory trigger. The single best way to have better transportation projects with fewer ecological and community impacts is to involve all people and resources early in the planning process.

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Glickfeld listed three things that could be done to improve the EIS/EIR process: First, the process should discuss things that polluted instead of things that did not. Second, the resource agencies have to engage early. Third, there must be more planning by watershed. Dynamics of a watershed are very important to survival of species and public health (seafood, swimming, etc). All new transportation systems in Washington are being planned watershed by watershed and that's hard to do. Doug Searns of Colorado has done a lot of writing on third generation greenways. Traditionally, we align our roads and railroads parallel to streams and we dump waste into the waters before letting it percolate through anything. Searns has learned how to combine trails, recreational facilities, and multi-modal connections for watershed improvements and restoration. It is a holistic, win-win approach to transportation.

DISCUSSION

Greg Harper, AC Transit, agreed with **Glickfeld**. AC Transit is considering, all encompassing total sustainability studies on all of its operations, to determine how green they could be. Have you had experience with those types of studies, and do you put any credence in whether they are worth doing?

Glickfeld reported that the City of Santa Monica has implemented an environmental indicators program and it has applied a certain number of measures every year, for certain things including the cleanliness of its transportation operations. Other cities have environmental indicators, and I think Caltrans does also. She reiterated the importance of the need to consider the design and manufacturing of the vehicles, not just the engine and the fuels.

Davis added that the City of San Francisco also recently completed a sustainability project with a community-based process, but it is too early to identify specific benefits.

LeRoy Graymer, UCLA Extension Public Policy Program, commented on **Cackette's** discussion about manufacturer dates for improvements in vehicles. He was concerned that because diesel engines last a long time, when would the new products be completely phased into the fleets? These seem to be the real points of analysis for whether bus fleets will be performing like the automobile fleets that are already on the road.

Ortner responded that the FTA lets operators write off the bus after 12 years. OCTA's policy is to replace the engine with a new engine after six years, instead of rebuilding it. Other agencies, depending on budgets, have to operate within the regulations.

Cackette added that operators can replace the engines but many of the oldest buses cannot accommodate the newest systems. So there are some limitations because of changes from non-electronic to electronic controls. The turnover for ferries and water transports, however, is almost 40 to 50 years, and those are where retrofits are necessary.

Mark Brucker, EPA, added that AC Transit is putting brand new clean engines into 1984 buses, and working with the manufacturers to get engines that they can put into the buses. The problem has not been so much the age of the bus, as the size of the bus. So it is possible to put a clean engine in an old bus, as **Cackette** discussed, and if a car lasts for 14-15 years, buses are turning over about two to two and a half times faster than cars.

SESSION 9: LESSONS FROM ABROAD: WHAT U.S. TRANSIT SYSTEMS CAN LEARN FROM THE DEVELOPED AND DEVELOPING WORLDS

David Bayliss, Director, Halcrow Consulting, United Kingdom

Robert Cervero, Professor of City and Regional Planning, UC Berkeley

Gordon J. “Pete” Fielding (Moderator), Professor Emeritus of Social Sciences, UC Irvine

David Bayliss talked about transport in Europe and compared European nations and the US with some reference to Canada. It is difficult to find any reasons why transit in Canada is very different from that in the U.S. despite similar physical and economic characteristics in these two nations. There are some cultural differences and great difference in governmental structure between Americans and Canadians. The provincial regional government in Canada has more power and is able to take initiatives over land use and transportation policies, which is not as possible in the U.S.

Bayliss discussed differences in system provision. The U.S. has three times as many roadways as does Europe, and about 1/3 as many passenger railways. Europe has a population of 375 million and is more populous than the U.S., with one third of the area. Americans use automobiles much more, buses less, and rails much less than do Europeans. With all modes taken together including walking, biking, and others, Americans travel almost twice as much as do Europeans. Particularly, Europeans make more use of public transit.

In addition to very limited growth in population in Europe, there is a higher growth rate in transit use. In contrast, in the U.S, population growth is higher than the growth in transit use. Transit rides per capita in the U.S. have declined.

An important conclusion from a recent comparative TRB study is that urban form has very important effects on transit use. There are five differences found in Europe: European cities are generally denser, have less developed space per capita, have a stronger business district, were developed around transit before mass auto ownership, and are consequently better oriented to mass transit. Transit use, walking, and biking vary by population density. The number of these trips is very high in areas with high population density, because most walking, biking, and transit trips are shorter than auto trips. The differences between American cities and European cities are quite clear with more dense European cities relying much more heavily on transit and slow modes for mobility than the U.S.

There are also differences in public policies affecting transport between the U.S. cities and those in Europe. Urban planning and public policies in Europe cities are more conscious about restricting sprawl, and are designed to limit the access by automobiles through supply and pricing. Most European cities have developed a plan to link new development to a provision of transport facilities with high passenger capacity. Attitudes toward automobile are less favorable in Europe. The higher taxes on auto ownership and especially use are generally not earmarked for road construction and maintenance. Funding and operation of transit are very organized in Europe, and transit agencies are able to develop a long-term plan, and also able to win priorities.

An example of strict auto policies is the parking standard in London. Developers who want to construct a new building must adhere to a maximum standard, above which it is not permissible to provide off-site parking. A developer may provide less if they wish so. Similarly, there are limits on the number of residential parking spaces for dwellings in inner-cities. There are growing examples of auto-free residential areas served only by transit and communal car trips.

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Parking availability and transit use are related because the majority of people will use automobiles where there is plenty of auto parking. As the parking-to-jobs ratio falls, transit use in general rises. In European cities, the parking-to-jobs ratio in CBDs ranges from 1:2 to 1:10, the use of transit use ranges from 15 percent to 30 percent with some exceptions such as central Paris etc. In the U.S., the ratio is more generous, and transit use is correspondingly lower. In the UK, local authorities are given powers to impose work place parking levies on employers. The revenues from these will be available to support transit. Thus, this policy could both restrain auto use for commuting as well as funding transit service improvements. However, so far no authority is using these powers.

Although there is talk about pressing for more rational transport pricing in Europe that reflects full economic and environmental externalities, implementation of such structures is politically very difficult. These policies help to moderate auto ownership in Europe, especially in Denmark where very high taxes on car ownership produce 25 percent lower car ownership than the European average, and Danes travel more than the average European. It is reasonable that auto ownership is followed by auto use, which has significant implication for transit use.

One feature that characterizes many European cities is pedestrianism in extensive sections of the traditional city center. This has made the CBD more attractive and promoted transit in two ways. First, it focuses more on metropolitan travel along main rail corridors where transit can offer an attractive way of traveling. Second, within a CBD, transit use has priorities making accessibility more convenient than that by car.

In Europe, transit operations are provided and funded by the public sector as a service to citizens. While the public sector in Europe is keen to contain expenditures, people recognize that public transport requires public support. More patronage means a higher cost recovery ratio as well as higher levels of service to be provided. Cost recovery ratios in Europe are substantially higher than that in the U.S. Accordingly, funds can be applied to enhancements and extensions of services.

More recently and quite controversially, there is a move to separate planning and operation to introduce an element of competition to improve efficiency. Bus privatization in the UK has been done in two different ways: In London, a planned integrated network has been maintained, and bus services procured. Outside of London, bus services have been deregulated, and any licensed operators can run services and charge fares to pursue profits. Where this commercial network is inadequate, a local authority supplements services. As a result of bus privatization, costs and subsidies have fallen dramatically.

There are many forms of public and private partnership for transit system development that could be tried especially in the U.S. However, it should be approached with some caution. Croydon Trams in the UK is a successful example, whereby the public sector takes initial political risks and provides a share of capital costs, and then a private concessionaire finances, operates, and bears the construction and commercial operating risk. This arrangement was designed to bring construction and operating efficiency from the private sector while ensuring a project provides community value, for which public funds are allocated.

While bus service has expanded in Europe in the last 20 years, most transit operators emphasize enhancing quality by using low floor buses, low emission vehicles, traffic priority, real-time passenger information, and off-vehicle payment. Public transit systems provide higher speeds by taking advantage of longer bus-stop intervals in Europe, which more than compensate for longer access distance to stops. They also provide reliable service employing priority turn bus lanes, bus gates, and guided ways to simply allow buses to avoid long detours, and gain access to streets not

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available to traffic generally. Bus borders have been recently introduced to prohibit illegal parking and blockage of busways. In the UK, bus quality corridors, which combine a whole series of measures by operators and authorities to bring together better services, better staff, better facilities on the streets, and better facilities at stops, have been introduced.

Two innovations that transit operators have developed to serve the market are: (1) rail links to airports which are developed extensively in Europe, and (2) a combined transit and auto hire pass. People can use a pass during the week to take transit, and rent a car at a discounted price from a distributor on the weekend. This innovation has led to both reduced auto-ownership and increased transit use. In addition, an introduction of travel cards back in 1998 increased transit ridership by 25 percent, increased fare-receipts by 10 percent, reduced fraud by a half, saved ticketing costs, reduced queuing, and reduced car travel to the CBD by five percent. Since then, the number of cars entering the CBD has been steadily declining. The total benefit of all these phenomena was estimated at approximately 500 millions pound per year.

European dense settlements, many of which were shaped before widespread of auto-ownership, is especially conducive to transit use. It would be unrealistic to expect transit use in the US to match that in Europe. However, it is not unrealistic to expect transit use in the U.S. to move toward what we see in Canada where people ride transit twice as much as in the U.S.

Some European innovations that deserve more attention are: (1) auto use and management policies favoring transit, (2) service procurement producing real benefits, (3) innovative financing of transit projects producing more cost-efficient projects, (4) transit priorities that are extensively implemented particularly where congestion is severe, (5) the bus quality corridors concept, and (6) individualized markets. While many of these initiatives have been thought about in the U.S. already, Europe provides valuable lessons because these have been put together in coherent packages and pursued by policies and programs over a number of years.

DISCUSSION

James Corless, Surface Transportation Policy Project, asked about performance measures used in Europe and standards to measure the success of transit. **Bayliss** responded that service quality (such as service frequency) and cost efficiency (such as cost per vehicle hour and cost per vehicle mile) are very important. Overall measures of transit ridership are also important.

Robert Behnke, Portland, Oregon, asked **Bayliss** to talk about farebox recovery. **Bayliss** answered that the cost recovery ratio on buses is down to 92 percent, from 99 percent two years ago. On the London Underground, the cost recovery ratio of operating costs and revenue costs is 140 percent. By the general European standard, this is very high. A full cost recovery ratio analysis across Europe gives a number about 50 percent.

Robert Cervero began his presentation by stating that if we think about transit invention, we often think first of knowledge transfer from the industrialized developed world. However, in other regards, we have a lot to learn from other places such as: (1) efficiency in public transportation in connection with urbanism and land use, (2) the concept of service differentiation, and (3) financing—innovative ideas about value capture, ways of financing infrastructure, etc.

In Curitiba with a metropolitan population of about 3 million, people had a vision of a metropolis reinforced by transit. Their vision, expressed by a phrase “Planning for People vs. Cars,” is to create a European style pedestrian zone and five zones of urbanization, which are balanced in mixed use. A development plan shows transit lines laid out to serve their land use and urban form

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visions. Instead of having bus corridors go through the center from one core to the other, the center is kept very pedestrian oriented. Curitiba also developed Bus Rapid Transit, which is characterized by dedicated lanes that have been used in other parts of the world to achieve efficiency. The use of dedicated lanes has two purposes: 1) to increase utilization in the presence of directional imbalance in flows, and 2) to discourage people from slowing those lanes. Transit transfers happen mostly in periphery areas, and the process of transfer is made as seamless as possible using new technologies. Differentiated services serve all kinds of ridership – short-distance trips, intermediate-distance trips, and long-distance trips on two parallel routes in the very dense grid network. As the density tapers, the service goes down. This is the best example of a corridor scheme integrating land use and transit.

The very fine resolution of inter-mixing origins and destinations with many functions in Curitiba means a balanced mixed land use development, which leads to a well-balanced use of traffic lanes and buses. This produces efficient utilization of resources. An inter-district system as well as inter-district buses running across town make the five corridors work in concert, and interchanges are made as efficient as possible.

Comparison between Curitiba and Brasilia, both of which are among the wealthiest cities in Brazil, have the same population of 3.5 million, and have a comparable auto ownership rate, reveals totally different physical forms. Brasilia is the national capital designed with very strong formalism. It is relatively dense, but segregated in terms of functions and scale of roads. Although it has a good bus system, origins and destinations are spread out so much that transit hardly works. The average distance of people to the center is three times as long in Brasilia as in Curitiba due to land use segregation in Brasilia. Thus, Brasilia is much more car-dependent.

Next, Cervero discussed innovative paratransit services in developing countries. Typically, when transit agencies have been incapable of running buses, industrious and hard working entrepreneurs have stepped in to fill market niches. These entrepreneurs in developing countries cover a very broad spectrum: Many of them have semi-fixed routes operating like buses, and some are more flexible like taxis, providing door-to-door services. A key trait of the paratransit sector is that it is informal—some of them are unlicensed or not registered. These entrepreneurs have got their eyes on the market and get good market response.

There is also a rich market differentiation. On one hand, many van services provide the better services to choice riders on the line haul system for longer distance commute. On the other hand, micro vehicles serve low-income people as well as provide distribution services. Prices vary a lot with differentiated services in different times of day—rates may go up by 30 percent one day when the market gets more captive consumers. Examples of such jitney services can be seen in Rio de Janeiro and Manila.

Since pure paratransit, unregulated, can lead to chaos (such as cutthroat competition and overtaking), which one finds in Nairobi, Lagos, and Kingston, there must be some limits. However, a transit service cannot be designed just to create a monopoly either. In monopoly, transit providers have pure control of the entire traveling market with very little incentive to edit it. Something between these two extremes is needed.

Cervero indicated it seems better to largely let the paratransit marketplace determine service quality standards, including insurance. There may be a need for public rules for licenses, special plates, low-interest loans for insurance, and requirements for helmets and queuing areas. But while the public sector has stepped in to set up rules in some cases, most cases exhibit self-police and self-enforcement, because stakeholders ultimately would like to eliminate anarchy and cut competition.

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Value capture is the third transit innovation that can be seen in Tokyo and Osaka, Japan. Seventy percent of railroads are privately built by companies making much of their profits from other businesses such as land development and retail shopping centers. In this way, a good nexus of land use and transportation can be produced. It can be seen in Japan that a premium for land value significantly increases as a function of distance from transit stations.

Cervero also studied some of office development which is near freeways and commuter rail lines in Jakarta, and was able to measure very significant value added. Jakarta recognized this premium, and passed legislation for a benefit tax about three years ago. This legislation requires landowners at a certain distance to contribute to roughly 60 percent of capital and construction costs of transportation facilities.

In conclusion, **Cervero** stated that land use management is important, as can be seen in Curitiba. If you have a good vision of a region and have a strong center with balanced mixed use and functional corridors, transit can work well. Another lesson is that the monopolist approach toward fixed-route fixed-scheduled services might have worked 30 or 40 years ago, but simply doesn't match emerging markets. Lastly, transit creates benefits of accessibility. **Cervero** recommends that instead of having a model in which the public sector invests in transit, and the private sector develops land, get back to a model that we had a hundred years ago. In that model, the private sector developed both transit and land use, which resulted in more transit oriented development.

DISCUSSION

One participant asked about environmental impacts in developing countries. **Cervero** admitted that there are many problems with vehicle emissions and safety issues, and stated that these problems are products of poverty, and can be addressed better in industrialized settings like in the U.S.

Linda Wilshusen, Santa Cruz County Regional Transportation Commission, asked for any suggestions of incremental steps that can be taken to introduce concepts presented in this session. **Cervero** suggested deregulating market entry by setting safety standards, and a lot of services will be introduced. The reason why this does not happen is that there are beneficiaries in the current system. Protected monopolies—transit agencies and taxi companies—do not want competition. It is politically very hard to change this. However, we can still get some core principles, like service differentiation, or we can take incremental steps of allowing jitney type services.

Bayliss commented that it is plausible to apply some concepts from Europe to the U.S. Demonstration projects should be conducted in very favorable settings. He was less enthusiastic about deregulation, but stated that taking effective steps—initially competition in a regulated framework – could introduce entrepreneurship. However, it is a question of how we move from a regulated framework to deregulation and still keep public interest objectives in place.

Bayliss stated that there is less market segmentation in very thin transit market in the US than in other countries, and there is a risk of monopoly as a result of consolidation. Therefore, one must be cautious when applying ideas from other countries to the US. **Cervero** added that there are principles we can learn from other places, that we have to take small steps, and that there is a niche market especially for jitney service.

Responding to **Roger Teal's** request for comments on the case of Ottawa, **Cervero** reported that Ottawa defined how it wanted to grow, and based on that vision built a transit system to shape the

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growth. People in Ottawa said they did not mind working and shopping in dense urban nodes but would like to live in single family housing in suburbs. They had a clear image of suburbia spread out with a fair amount of regulated land uses that ensures employment and retail growth happening along well-defined transit corridors. Flexible bus service served that urban form very well.

Martin Wachs, UC Berkeley, asked about trends in auto use in Europe and in Third World countries, since the use of public transportation in part depends upon congestion or lack of capacity to accommodate growing auto ownership and use. The punitive behavior toward automobiles is playing a major role in the increased use of transit, but overall, transit mode share is still decreasing despite all the successes.

Bayliss agreed that improvements in public transit service has very weak impacts on traffic congestion, that if we would like to reduce traffic congestion we need to price automobiles directly by schemes like parking charge and high auto taxes. Transit helps, by making measures a little more politically acceptable, but transit itself will not do the job.

Cervero stated that affluence is certainly helping to increase auto ownership and use regardless of the level of transit service. In developing countries, they do charge significantly more for car ownership by the excise taxes, the import duties, and the registration fees. While Jakarta happens to have a lot of petrol and historically subsidizes the gasoline, the gas prices are higher in most places. Although the middle class owns cars in Curitiba and all over Brazil, you find a more judicious use of the car. People take transit where it has real advantages — in peak hours, downtown, and in dense corridors, while people drive for things like weekend excursions.

A question was raised by **Paul Zykofsky**, Local Government Commission, regarding efforts by transit agencies to reinvent themselves on a large scale. For example, an agency in Boulder Colorado, redesigned its system based on extensive public input and got significant ridership increases. **Fielding** responded that his discussion earlier included some examples of agencies doing route restructuring and market analysis for this purpose. It is hard work and time consuming. It is a problem when agencies try to do this for a large area. They need to do it segment by segment over a long period of time.

SESSION 10: TRANSIT SERVICES FOR THE NEXT GENERATION

Melvin Webber (Moderator), Professor Emeritus, Department of City & Regional Planning, UC Berkeley

Roger Teal, President, TWJ Consulting, Wilmette, IL

Robert Behnke, President, CO-WIN, Inc. Portland, OR

Jonathan Levine, Associate Professor of Urban & Regional Planning, University of Michigan

Mel Webber introduced the next session. During the symposium there has been much discussion about the spread of suburbs and the increasing complexity of origins and destinations. Most trips are from one suburban place to another, making it difficult to fill a bus or train. Obviously, automobiles work well in these settings, while transit does not. One approach is to develop a transit system that behaves like a car, delivering door-to-door service with no wait and no transfers. Is this a possibility for transit?

Jonathan Levine discussed the challenges of transit in low-density areas, and reinventing transit to take on the attributes of cars. **Levine** discussed some examples of what already exists, and compared transit issues facing large urban, mid-sized urban and small urban areas.

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Providing service in smaller suburbs, rural towns, and low-density environments presents a significant challenge to both fixed route transit as well as to flexible paratransit solutions. Low densities mean long distances between pickups, and paratransit specifically faces cost challenges. Consequently, many paratransit experiments in the 1970s went out of business, some because they were victims of their own success. They attracted too many riders but the subsidy per rider was unbearable.

Levine categorized Michigan's transit systems into large urban systems (such as Detroit, Lansing, Suburban Detroit, Flint, Ann Arbor, and Grand Rapids), medium to small systems, and non-urban systems consisting of a long list of small cities and areas. When comparing the vehicle hours and vehicle miles per capita between the three categories, there is no significant difference.

However, when comparing the cost effectiveness of putting service on the road in terms of vehicle hours per \$1000 of operating expenses, large urban areas have a significant advantage over medium/small and especially non-urban areas. This is easy to explain because there is a lot of non-union labor working in the rural systems, and more informal kinds of arrangements, avoiding the lumped-in labor bureaucracy relationships of some of the larger systems.

And, of course, when looking at passenger trips per vehicle hour, the non-urban systems are at a terrible disadvantage. There's a combination of lower cost operating per vehicle hour, but considerably less usage per vehicle hour, leading to considerably more operating subsidy per passenger trip for those rural area systems that adopt the flexible door-to-door paratransit like approaches. This poses a dilemma because we need some approaches for dealing with the inherent cost disadvantage of few pickups per vehicle hour or long distances between pickups. There are three potential approaches for dealing with this – (1) technology, (2) decentralization, and (3) privatization.

Technologically the main forms would be global positioning systems that link into automated scheduling routing and dispatch. Dispatchers would have good information and can make optimal decisions. That would seem to hold promise for efficiency gains, but we haven't seen that promise kept yet. And one reason is because technology doesn't necessarily do better in routing and scheduling than human dispatchers.

Levine presented some data that showed that passengers per operated vehicle mile declined after the implementation of advanced scheduling and dispatch in suburban Detroit. **Levine** does not attribute the decline to the deployment of the technology, but that there is scant evidence that there are efficiency gains to be had with new technology. Some of the dispatchers are really good and make human judgements based on quirky esoteric knowledge about the territory over which they dispatch. These are decisions that the computer cannot perform. This does not mean we should stop the digital age, but we haven't found the evidence that we will make large gains with only technology.

The second non-technological and institutional approach is decentralization. Rather than have a single provider serve the region, many individual organizations can sometimes better serve the communities and provide appropriate service. This creates the advantage of being able to tailor services according to the needs of residents. For example, some areas will be concerned with recreational travel, others will have more elderly travel needs, while still others are concerned about short trips. The danger with decentralization is the parochial action on the part of the decentralized communities. He interviewed operators in these decentralized services, and found evidence of resistance to designing and providing services for non-residents of the area. The lack of coordination because of inherent competition and different interests becomes very real, and becomes a barrier to regional mobility, even if one does a good job with serving short trips.

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Robert Cervero spoke previously about the various options available for privatization, and **Levine** reiterated the sentiment that we need to be more creative. There is a lot of service provided by non-profit, social service, medical, ethnic, and religious organizations. They have vans all over the place, and there are empty seats in their vans; there could be efficiency gains if only there could be coordination. The downside, however, is that there is a lot of resistance to such coordinated efforts.

Levine discussed the concept of geographic equity, where residents should receive some minimum level of transit services no matter where they live. To **Levine**, however, that level of geographic equity sounds highly inequitable, because residents of a rural community who need transit would command subsidies that are much greater than residents of urban and inner-suburban communities whose needs can be served relatively cheaply. This type of structure would therefore divert scarce transit resources away from the cities and inner suburbs into the low density areas.

Consequently, policies or investments that encourage universal or near-universal expansion into low density areas may paradoxically reduce total transit ridership if they spread transit resources too thinly. If this is the case, policymakers will have to consider the option of focusing transit resources in areas where they are most effective. Massive investments in hard-to-serve trips in low density areas may threaten the overall capacity to serve the people who choose to live in transit-friendly areas. Along with technology, decentralization, and privatization, we also need a triage option. We need an option where we can provide subsidized transit to some areas, and forgo service in other areas. Similarly, those who need transit services must make choices, too, to either live in areas where we can provide services efficiently, or understand that those services are not going to be subsidized in low density areas.

Robert Behnke described a new technology, the wireless Internet, which can be applied to public transportation systems. With wireless Internet, users can have access to the Internet anywhere, anytime as long as you have a palmtop or a laptop. Applied to transportation, it can dramatically increase the ridership and reduce the cost per ride.

Like **Levine**, **Behnke** also discussed the death of demand-responsive service. A *New York Times* article from 1975 describes the death of a dial-a-ride service in Santa Clara County that allowed anyone anywhere to call for a voice-dispatched ride. In today's dollars, the cost per trip was about \$15 to \$20 one way. Because it connected local services with express buses, people loved it – but the costs were too high to sustain the program.

Behnke also described a system in Germany that was created to respond to the new development of jobs and housing in low density areas. One suburb outside of Hanover instituted a system called Ruf-Bus, or “Call Bus,” that used kiosks along the bus stops all throughout the city. Each kiosk was numbered, and users would follow voice prompts and enter destination codes and any other special needs (such as wheelchair access). The information would be analyzed against the resources available. The system would first search for an appropriate fixed route bus within the next ten minutes. If there was none, the system would search for a government-operated dial-a-ride system, including contract taxi cabs. It was an elegant system, and users did not know whether they would be picked up by a fixed route bus, a mini bus, a route deviation service, or cab. It was very popular, but unfortunately transit agencies in Germany faced high capital costs, and the project died. The project demonstrated that the algorithms are possible, as are the individual on-board computers and communications equipment.

Drawing from this idea, **Behnke** suggests a similar network for palm pilots or cell phones with wireless, ubiquitous Internet service. This opens possibilities for individuals to contact car pools

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and route deviation services. Drivers traveling from one point to another who have empty seats, and if given preferred parking or other incentives (such as monetary payments or tax exemptions), can provide rides to carpoolers and other travelers. Poor people who would like to provide rides a half hour before or after work could then earn money to help pay for the cost of their cars. The costs of such a system would be low as long as the wireless Internet service is established.

Behnke discussed whether people will use this kind of service. The FTA conducted some market research in the Seattle area, and the DOT in Hawaii found that in congested corridors, 10-30 percent of the single occupant cars could be taken off the road with this type of system. This would then reduce congestion delays by 50-60 percent without the need to build road capacity and without adding new buses or new light rail service.

Meyer and Gomez-Ibanez found that 50 percent of people would use the service if they could get door-to-door service within ten minutes of a request, at a cost similar to that of driving. While **Behnke** believes the number may actually be a little less, nonetheless the potential is significant. **Behnke** reported that Sandy, a small community just outside of Portland, has coordinated with the private sector and found funds to conduct a small demonstration project in a single corridor. There is interest from federal sources to conduct additional demonstration projects outside of the state of Oregon. **Behnke** encouraged participants to contact him with other urban or suburb-to-suburb corridors that may be interested in testing this concept.

Roger Teal described the gains made over the last 30 years, discussed the current situation with “next generation” services, and highlighted some lessons that can be applied to future developments. He also briefly reviewed the public transportation technology, the importance of platform-based solutions for new technologies, the prospects for these new generation services, and lessons learned.

Teal reported that many of the services discussed today were actually invented some 30 years ago. He referred to a set of publications called *Tomorrow's Transportation*, published in 1968. This series of about 20 publications was a pathbreaking intellectual undertaking, and is still impressive today. In the late 1960s, the authors, including Jerry Ward, were aware that travel patterns displayed the scattered origins and destinations that characterize travel patterns in urban areas today. The publication covered the entire gamut of possibilities. All were plausible and some required more technology than others.

Tomorrow's Transportation included personal rapid transit, dual mode highways and vehicles or automated highways, demand responsive transit, public automobile services such as car pools and car sharing, bus rapid transit, high speed fixed guideway service, and flexible route transit services with route and point deviation. These visions are what we consider today as “next generation” of services, despite the fact that they were envisioned 30 years ago.

So how has this 30-year vision played out in reality? The industry has implemented a lot of demand responsive transit. However, this service has been totally marginalized to a small niche of our transit system, although it was originally conceived as a service for the general public. In the U.S., there are fewer than 20 high-tech systems that have fully automated vehicle control systems, software, mobile communications, in-vehicle terminals, and computers.

In flexible route services, there are less than ten systems, and this is a conservative estimate. One of the few examples of this service is in suburban Virginia; this service has been in development for seven years now, and has proven to be very hard to implement successfully. As **Behnke**

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discussed, there are interesting flex route and demand responsive transit services in Germany and Sweden, but again there are very few – about 15 to 20 – systems in Europe.

North America has developed some good systems of bus rapid transit, and Ottawa is a prime example. However, nothing has developed in personal rapid transit. Chicago made some attempt and spent some money, but ultimately nothing was produced. There has been progress in automated highways, but we are still a decade or two from putting these into operation. And it still is not clear how public transit fits into that innovation.

Technology has changed many facets of our basic daily lives, but our transportation system developments have not been as exciting. There are several reasons why the technological innovations have not been incorporated into public transportation.

First, public sector entrepreneurialism is an oxymoron. **Teal** admitted that this statement risks alienating a significant share of the audience, but it is not intended to be pejorative. It is not necessarily true that the public sector should be expected to be entrepreneurial.

Teal defined entrepreneurialism as the relationship between risk and rewards. An entrepreneur and an entrepreneurial organization take risks with technology, capital, and business strategies in pursuit of financial rewards. Often the risks and the venture do not succeed, and in the world of entrepreneurs, this is not a bad thing. One continues to pursue the same goals as before, this time armed with more insight and knowledge. However, in the public sector any type of failure is considered extremely undesirable, and therefore public sectors tend to avoid risks. The dilemma for public sectors is that there is no progress without risk. While public agencies and public transportation agencies are relatively “blunt instruments in innovation”, they can do reasonably well at adopting models that have worked elsewhere, that are procedural and well documented. Replicable models are key to the public sector implementation, and have also been lacking in the past 30 years when it comes to technology-enabled innovative transportation services.

Teal pointed to some private sector advances in demand responsive and flexible operations, such as Federal Express delivery and taxi and limousine services. These industries have spent from hundreds of thousands to billions of dollars developing and deploying technology to streamline and automate operations. These contrasting records between private and public sectors is evidence that the problem with public transportation is not the lack of technology, but the public sector’s lack of entrepreneurialism and the aversion to risk. Understandably, such investments and risk are difficult for public sector agencies.

Teal offered some suggestions for adopting and integrating public transportation technology. Three critical components are the physical infrastructure (such as guideways and vehicles), the operating strategy (how a vehicle is intended to be operated on a guideway or roadway, such as skip stop, fixed route, demand responsive, or flexible route deviations), and the control system (which enables the operator to execute the operating strategy).

For low to medium density areas, flexible route deviations – that is, service that deviates between fixed points to pick up and drop off passengers – is a strategy that can work. To execute this strategy, however, one needs an automated control system that determines when to make deviations, keeps track of the vehicle location, and ensures that the appropriate balance is maintained to provide a standard level of service to each individual rider that is comparable to the level of service provided to the ridership as a whole. The goal is to overcome some of the problems with demand responsive systems, by asking some riders to walk to the system, while others may be picked up at their doors. These are tradeoffs to get lower cost per rider and increase productivity, and a control system is essential in this operation.

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Another important issue for the public sector is the need for platform-based, pluggable technology. The National Taxicab Association is dissatisfied with its investment in technology because of cost and maintainability. Technology has been proprietary and terminal replacement and upgrading has been very expensive. With platform-based technologies, however, technologies and applications are built incrementally on a common platform, so that new hardware can be incorporated without fear that the technology will change and make applications obsolete. Public sectors, therefore, do not need to reinvent technologies and therefore face reduced risk.

Teal, like **Behnke**, discussed some possible platforms that could use PDAs or mobile computers and cell phones, but unlike **Behnke's** more market-based concepts, **Teal** focused on these applications for public transportation innovation. **Teal** summarized his presentation with some lessons. First, public organizations cannot be expected to be entrepreneurial, but they can be expected to be innovative. And, platform-based technology solutions reduce complexity and risk for public agencies because they have been shown to work.

DISCUSSION

One symposium participant challenged **Teal's** assertion that public institutions are not entrepreneurial. He used UCLA as an example of a public institution that has produced innovative and entrepreneurial developments.

Teal responded that UCLA is entrepreneurial only to the extent that it has created certain units within the university to undertake these special missions. If these units are successful, they continue without resistance. However, they can be dismantled without risking the entire institution.

Jerry Ward, co-author of *Tomorrow's Transportation*, commented that **Teal's** message is one of the more important lessons to be learned in this symposium. The first challenge is the landform in low density suburbs that are problematic to transit service. **Ward** believes that to solve these problems requires "more civilized" versions of transportation that **Cervero** discussed and concepts similar to those that **Behnke** proposed.

The second challenge is providing downtown circulation. High-density circulation makes cars inappropriate, and transit as we know it today is the answer, especially BRT. The third challenge is doing more to alleviate traffic and freeway congestion. We have taken a fatalistic view that we cannot build our way out of congestion, so we have not pursued other means. With the existing freeway and road infrastructures, minor modifications can continue to alleviate congestion, and that is a direct challenge to transit service as well.

Mel Webber asked how public agencies could be modified to be more entrepreneurial.

Ken Schmier, Next Bus Information Systems, Inc., underscored **Teal's** message. Next Bus is building a system that tells riders when the bus will arrive. To operate the system, bus locations must be fed on a constant basis. The company uses public data radio, a system built by AT&T, capable of transmitting 140 kilowad of data. Essentially, this is an Internet connection on the bus, and much of this is possible only because of standardized products. **Schmier** expressed frustration, however, because the Los Angeles County Metropolitan Transportation Authority is issuing a \$50 million RFP for a private radio system that will transmit 9600 wad, shared among 100 vehicles, that cannot communicate data and will require customized tools when the time comes for upgrading or adding new services. The public platforms are also at one tenth the price of the proprietary stuff. **Schmier** asked why mindsets continue to favor this approach?

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Teal suggested that people become focused on a small part of the problem, and think that if they buy the technology, they can use it for free. However, they are paying \$50 million to use something for free.

David Bayliss, Halcrow Consulting, asked **Teal** how far should a system go to a customer while achieving cost-effective outcomes. Successful dial-a-ride systems in Canada did a good degree of negotiations with the caller, with time of travel, etc. Such systems allowed people to get cost effective vehicle utilization, and also created a different kind of service relationship between the provider and the customer. How far do you need to customize a demand responsive system to act like an automobile, and how do you mix human intelligence with technology?

Teal responded that today's software allows a human scheduler to make the trade-offs. Some pure demand responsive services in Sweden are converting to flex route services instead, because densities are a little higher, allowing them to operate still like a Dial-A-Ride service rather than fixed route service. They've automated the whole thing with automatic voice response, call backs, and all the things we have been talking about for 30 years. The human element is still there, but you get passed to a human only if the request cannot be handled automatically.

Behnke disagreed with **Levine** on some points. The U.S. decided to provide ubiquitous mail service around the country. Mailing a letter to a rural area was much more expensive than sending mail to downtown areas, but we decided to provide universal service. Rather than think about providing the transit service either selectively or universally, **Behnke** emphasized providing enabling communications service universally as infrastructure for demand responsive transportation such as ride sharing and car pooling. One way to finance this system would be to enact a small surcharge, but the benefits would be universal.

Jon Burkhardt, WESTAT, suggested that anyone interested in new paradigms should read TCRP Report #58. It discusses Federal Express, General Electric, and how these businesses shifted from an old product-oriented paradigm to one focused on consumption, service, and quality. If transportation can tie these lessons into technologies and organizations, we will really have something. The old paradigm was production oriented, and a new paradigm is consumption oriented, focusing on service and quality. If we tie that into the new technologies and organizations, we'll really have something revolutionary.

As chair of the TRB Rural Public Transportation committee, **Burkhardt** took exception to **Levine's** position about the transportation triage system. **Burkhardt** argued that a broader perspective is needed, as well as alternatives. Moving people from rural areas into cities to gain transit access also presents costs. The state of Michigan does not do a good job in coordinating transportation services. Other states that do a better job include North Carolina, Ohio, Iowa, New Mexico, and California. One good example is Almo, Michigan, a small town of six square miles and 6,000 people. They have been operating a fabulous demand responsive system for three generations. Another reason to encourage public transportation in rural areas is because it creates innovative systems that have not been seen in larger urban areas. And that is a reason to support rural transit.

Jane Gould, UCLA Transportation Services, asked **Behnke** how he recommends building and ensuring trust and responsibility between drivers and passengers in a shared ride situation. **Behnke** recommended that all riders and drivers could be pre-registered to ensure safety and security.

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Webber closed the discussion with a suggestion. Because government may not be entrepreneurial, and because the industry needs guidance toward more innovative and entrepreneurial processes, perhaps universities hold the answer.

SESSION 11: PULLING IDEAS TOGETHER AND PUTTING THEM INTO PRACTICE

Brian Taylor (Moderator), Associate Professor of Urban Planning and Director, Institute of Transportation Studies, UCLA

James de la Loza, Executive Officer, Countywide Planning and Development, Los Angeles County Metropolitan Transportation Authority, Los Angeles, CA

Susan Shaheen, Research Scientist,, Partners for Advanced Transit and Highways (PATH) and ITS Davis, and Model Integration Specialist, Caltrans

Donald Shoup, Professor and Chair of Urban Planning, UCLA

Brian Taylor summarized previous sessions that explored models of change and innovative transportation practices. This session highlights examples in the US today that offer exciting ideas on innovative programs in transit. This session certainly is not an exhaustive list of promising changes, but they are interesting because they build on ideas and concepts explored during this symposium.

James de La Loza discussed the Metro Rapid bus system operated by the Los Angeles MTA, which has much of its intellectual genesis in the Curitiba model. **de la Loza** discussed briefly the MTA, and its dual function of operating its own transit system and also funding the other 14-17 municipal operators in the county. Much of this dual function has been helpful in bringing resources together and creating partnerships needed to implement a successful Metro Rapid system. One key partnership is with the City of Los Angeles in two pilot projects in two key corridors.

de la Loza presented a quick overview of the Metro Rapid demonstration project. Currently, the MTA is in the process of restructuring transit services into a three-tiered system. As discussed in previous sessions, most origins and destinations (about 55 percent of trips) stay within subregions such as the San Fernando Valley and the San Gabriel Valley. The other 45 percent of trips are dispersed throughout the county. Meeting these origin and destination patterns requires a system that can deal with both the subarea-to-subarea travel as well as the inter-subregional transportation needs. The first of the three-tiered system is line haul service, which includes the light and heavy rail system and the new Rapid Bus lines. Tier 2 service includes services that serve trips within subregions. These lines are closely coordinated with Tier 3 services, which consist of community-based shuttles, circulators, and paratransit services. These services hold promise in not only generating ridership but also increasing ridership on the rest of the system by feeding trips into other tiered service.

Why Rapid Bus in Los Angeles County? Los Angeles is both an interesting and a challenging place to design transit. Since 1980 there has been a 12 percent decrease in bus speeds. There was strong public dissatisfaction with the slow public transportation system. The Los Angeles Department of Transportation (LADOT) conducted a study and found that buses on major corridors are stopped 50 percent of the time, either at red lights, during boardings, or stuck in congestion. **de la Loza** traveled to Curitiba, Brazil, specifically to see the system, how it was run, and tried to bring elements of it back to Los Angeles. He and others also looked at other systems like Ottawa, Haddaway, Paris and London. The MTA then identified a simple route layout on corridors where three or four MTA routes merged, for a pilot project. Currently, Metro Rapid has two demonstration lines.

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de la Loza showed maps of the two project lines. One is the Whittier-Wilshire line, which runs between East Los Angeles to Santa Monica. The line serves a highly transit dependent population, and runs through the densest part of the city. The route is 26 miles long with 30 stations, and is served by 71 weekday peak buses on two and a half minute peak headways, and ten minute headways during off-peak periods and weekends. The second runs through the San Fernando Valley along Ventura Boulevard for approximately 16 miles. Service runs on ten minute peak and 12 minute off-peak headways.

de La Loza identified several elements of the project that make it unique and that have proven effective in delivering quality service.

First, Metro Rapid offers frequent service, with headway-based scheduling rather than point-specific scheduling. Buses operate strictly based on headways, and their spacing is controlled by a traffic signal prioritization system. Most parts of the two routes have signal prioritization, coordinated through a partnership with the LADOT. The agency currently is working with the Cities of Beverly Hills and Santa Monica to outfit the entire routes with signal prioritization.

One of the biggest problems for the Wilshire Boulevard line is bus bunching. With its two minute headways during peak periods, spacing between buses is very important for the highly congested corridor. Each Metro Rapid bus is equipped with a transponder that works with the city's system of road loop detectors. This communications system recognizes each bus's identification number, and measures its speed and location. A bus that is running ahead of schedule will trigger a red light to slow it down, and a bus running behind schedule will trigger a green light. An MTA dispatcher works closely with the city to tweak the signalization to optimize the speed and spacing.

The City was concerned about starting the project conservatively, and therefore agreed to offer signal priority rather than preemption. Some post-implementation evaluations and studies found, however, that there has been minimal to no effect on the traffic perpendicular to the Metro Rapid routes. In fact, the signal priority system has actually helped improve the total numbers of vehicles moving through these corridors, which was an unexpected benefit of the system.

The City of Los Angeles also has a system of cameras at various intersections, and by working closely with them, the agency can have quick access to information about accidents and other incidents.

The MTA received direction from the Mayor and its Board of Directors to get the system up and running very quickly, so some elements of the Curitiba system will be phased in later. While tube stations were not incorporated because of the time for implementation, Metro Rapid did incorporate simple elements such as low-floor buses, special graphics and logos that are easily recognized, and distinct colors to indicate specialized service. These were simple tools that worked for Curitiba, and were easy to apply to the Los Angeles project. Other elements that will be incorporated in later phases include exclusive bus lanes, high capacity buses, off-vehicle fare payment, multi-door boarding and alighting, improved feeder systems, and coordinated land use.

Simple station designs also have functioned very well for Metro Rapid. Light posts at the bus stops serve a dual function as light posts and canopy poles. At night, the overhead lights illuminate the intersection well, and during the day the canopy provides shade without blocking sidewalks or interfering with adjacent properties. Each station is designed in a modular fashion. The system is expanded with higher capacity vehicles. Stations can just be doubled by adding another module. Many adjacent businesses originally were reluctant to accept the overhead canopies, but more and more merchants are asking for them because they have been designed to

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allow good visibility of storefront signs as well. The agency is in the process of implementing public art at the bus stops and stations as well.

Stations also include “next bus” displays at each of the bus stops, that will tell the approximate arrival time of the next bus. This feature is currently active on the Ventura line, and will be implemented incrementally on the Whittier-Wilshire line. These “next bus” signs are tied to the route detector system, which is controlled by the City of Los Angeles.

de la Loza reported that the Metro Rapid service, which only stops at major intersections, is provided in addition to local service on these corridors. Riders therefore have the option of using the local or the limited stop bus depending on how far they need to travel.

The agency’s objective was to obtain a 25 percent increase in travel speed. The Whittier-Wilshire line achieved a 29 percent increase, and Ventura reached 26 percent increase in speed. Weekday corridor ridership increased by 33% on the Wilshire-Whittier line, and the Ventura line experienced a 26% increase in ridership. Weekday ridership on the two corridors is around 90,000 per day, which surpasses most of the light rail lines in the country.

One third of the increase in riders is new riders, another third is current riders who have changed their routes and are now riding Metro Rapid more often, and the last third is current riders riding more often. This last third supports some studies that say that transit dependents are riding less frequently and simply forgoing trips.

The next phases will expand the system countywide. **de la Loza** emphasized that this system is intended to overlay on top of the existing local service, and not replace these local lines. The agency is continuing to focus on developing its Tier 1 services, and will focus next on Tier 2 lines by decentralizing some of the planning processes for services within natural travel subregions.

de la Loza concluded by discussing how the MTA system is meeting needs of transit dependents. He showed a map showing areas with high transit dependency and low automobile ownership and income, and these areas match the MTA’s geographic coverage.

Susan Shaheen discussed shared vehicle programs, and described two specific projects – CarLink I and CarLink II – in which she is involved in the San Francisco Bay Area. Three characteristics are common to all types of shared vehicle programs. First, individuals gain the benefits of a private auto without the costs and responsibilities of ownership. Second, individuals access a fleet of cars rather than one owned car. Third, participants pay a per-usage fee or a subscription.

There are three types of shared vehicle program models. First, neighborhood car sharing, which was born in Europe, typically operates out of neighborhoods and helps meet car travel needs for those who typically take transit. The second and probably best known model is the traditional station cars, which are usually linked to transit stations to facilitate access to transit. The third type of program is the hybrid system, which combines the station car and neighborhood models for commuter-based car sharing.

The California Air Resources Board is considering, as part of the zero emission vehicle regulation, a new mandate to offer auto makers additional credits if they either participate in any of the three types of models. The credits, however, are the highest for systems that involve technology and linkages to transit.

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Shaheen then described car sharing's roots. The first instance of car sharing was in Zurich, Switzerland, which began in 1948. This program was a traditional car-sharing model, developed in response to growing demand for personal cars. Because people could not afford the costs of a personal car, they shared vehicles. This organization was in place for 50 years until 1998. More recent developments started in the 1980s. Currently there are over 200 active car-sharing fleets in 400 cities around Europe. These programs have over 150,000 participants, and the most notable programs are Mobility and StattAuto, operated out of Switzerland and Germany, respectively. Mobility is now offering car sharing in conjunction with the Swiss rail system; Mobility has a fleet of 2,000 cars, and 50,000 members in 900 communities and 400 cities.

The U.S. has 15 car sharing organizations, five station car programs, a total of 5,377 members, and ten more programs being planned. **Shaheen** recounted that when she began her dissertation in 1997, there were no car sharing programs in existence in the U.S., and this shows the remarkable growth of this concept.

CarLink is a hybrid program, blending the car sharing and station car concepts. It is a public-private partnership between Caltrans and Honda Motor Company, supported by the PATH program at UC Berkeley and the Institute for Transportation Studies at UC Davis. Both CarLink I and II use smart technologies, and include three types of user groups -- home-based users, work-based commuters, and work-based day users.

For the home-based users, the program offers a lease where in exchange for \$300 per month, households have access to a fleet of Honda Civics. The lease includes insurance, registration, maintenance, 24-hr roadside assistance, cleaning, and anything else a car owner would provide for him or herself in owning a car. One of the household members takes the vehicle to the transit port, where there is a critical exchange point. People come in to the transit station where the shared vehicle has been dropped off by the home-based user, pick up the car, and complete the rest of their journey to work. Additionally, people coming off of the transit line often carpool to their final destinations, so we are seeing that ridesharing is also working with the car sharing models. The carpoolers meet up and drive the car to the employer port. During the day, the vehicle is used in a day use program, so people have access to the vehicles for personal and business trips during the day.

At the end of the day, the process reverses itself, and the vehicle is left at the transit port for the home-based users, who take the vehicles home for use on the evenings and weekends. The system is based on the natural origins and destinations of people's daily travel, and facilitates access to transit and reverse commutes.

CarLink I was a pilot program to study and experiment with the car-sharing concept. The pilot program ran from January to November 1999, and used a fleet of 12 CNG Honda Civics donated by Honda Motor Company. The partners in this project included Caltrans, PATH, American Honda, BART, and the Lawrence Livermore National Laboratory that served as the employment site.

The purpose of the research was to study whether or not such a user service could be efficient for individuals, and whether smart technologies and shared use programs could be demand responsive and somewhat competitive with personal autos. The program evaluated responses to the program, monitored user travel behaviors, analyzed economic data, and tested the overall service quality and the advanced technologies.

The study found that environmental incentives were very high, in fact the highest concern among users. **Shaheen** reported that she is somewhat suspicious of this, because people like to report

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environmental concern. The next highest ranked incentive was cost savings and convenience. Based on household interviews and personal interactions with users, **Shaheen** believes this is probably the main reason why users enjoyed the system.

Users liked the sedans, but also wanted access to a variety of vehicles, such as pickup trucks, to meet their different needs. Members of the program also reported that they would share rides more frequently if communication could be facilitated. **Shaheen** commented that **Behnke's** ideas about wireless Internet devices such as PDAs and cell phones would be one possibility. Several home-based users also said that if the program were a permanent service, they would sell their personal vehicles.

Overall, CarLink commuters reduced vehicle miles per day by 20 miles. And, at least 20 new BART trips were generated per day from this small fleet of vehicles. CarLink II was launched on July 26, and has been in operation for almost three months. It is a public-private partnership consisting of similar partners with the addition of a CalTrain line in the Palo Alto area, and the Stanford Business Park as a participating employment hub.

CarLink II modified the business model a bit to reflect the needs of the area. Again, home-based users pay \$300 per month and business subscribers who use the vehicle for work-based commuter segments and work-based day use trips pay \$350 per month. The revenue stream for each car is \$650. CarLink II has a fleet of 27 ultra low emission Civics, again donated by Honda Motor Company. Honda also developed the advanced seamless technology for this program, which includes GPS, an in-vehicle navigation system, smart key access, a transponder in the windshield, and an online reservation system.

Employers currently enrolled in the program include SAP, Motorola, Genencor, and the Packard Foundation. Over 80 participants have enrolled, and approximately 54 of them are active drivers. Users collectively have driven three to ten cars about 4,000 miles in three months. The cars are averaging (across an 11 week period) about 450-500 miles per week, and 150 trips per week.

Shaheen reported that more ongoing data is needed, and the GPS system is useful for collecting information. CarLink II used focus groups to evaluate and finalize the program design, and participants are required to complete on-line questionnaires and automated travel diaries. The in-vehicle technology provides a data stream on vehicle miles traveled, user identification, time, fuel, and location.

CarLink II will soon transition to a permanent service. More information is available at www.gocarlink.com. **Shaheen** concluded by acknowledging the partners that made the program possible.

Donald Shoup summarized some of the wonderful services that have been presented, such as Metro Rapid and its success in improving the quality of transit. He then asked participants to imagine how much more popular these services would be if the service is free to the public, but the agency transit agency still gets paid for every ride. This is the promise of unlimited access programs, the topic of Shoup's presentation.

Shoup summarized some of the distressing news about transit ridership that has been presented at the symposium. Some cities in foreign countries have more transit riders than in the U.S. put together. Riders in the U.S. now occupy only 27 percent of the seats of public transit, and service improvements to attract new riders have often been costly and disappointing. Unlimited access provides some hope.

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One example is the university transit pass program. The program can be set up in many ways, but generally, students, faculty and staff use their ID cards as transit passes, allowing them to ride for free – to anywhere, at anytime, and for any trip. The university then pays the transit agency for every ride. **Shoup** described the program as a demand-side subsidy for riders and not a supply side subsidy for transit operators.

There are a number of programs across the U.S. Chicago itself has 20 of these programs. **Shoup** found that the average cost to the university is 61 cents per ride. Students made about 50 rides per person per year, and universities paid transit agencies an average of \$30 per person per year. This is pretty cheap for a transit pass, and also saves on transaction costs for all the fare payments, coin collection, and individual pass transactions. The passes speed up boarding, and avoid adverse selection -- only very frequent users buy regular transit passes, so agencies must price these passes based on the assumption that pass holders will ride a lot; passes are therefore very expensive, and infrequent users will not buy passes. University transit passes avoid this problem by making sure that everybody has a pass, thereby driving down the cost for each individual.

Unlimited access also uses excess capacity. Data collected from Chicago show that students tend to sleep through the morning peak and travel during mid-morning off-peak. Therefore, providing this service is cheap for transit agencies. One third of the universities pay for their programs out of general funds or parking funds, and two thirds of the universities pay for them through fees assessed on students. Students must vote for this fee assessment, and approval rates are extremely high, sometimes as high as 16 to one. For re-approval votes, the approval rates increase each year.

Of the universities that collected ridership data before and after the program, the smallest increase in student ridership was 71 percent, and some universities saw student ridership triple. And the growth continues in subsequent years.

One goal of universities is to reduce campus parking demand because spaces are very expensive. It is a transfer program taking from people who pay parking fees and giving it to people who otherwise pay transit fares. The program makes the cost of transit a fixed cost with zero marginal costs.

Shoup also reported that transit agencies gain from this program as well. It is good publicity for their services, and students are good riders and improve the environment on board buses. They do not carve up windows but instead read calculus books. Agencies also receive benefits that can easily be measured, especially in reduced operating subsidies. **Shoup** presented some FTA data on agency performance before and after unlimited access programs were implemented.

Urbana Champaign is an example of a small agency that adopted a university program. Ridership jumped 193 percent after the program, and the agency actually increased the amount of service because more people were willing to ride. The operating cost per ride fell to about one quarter of the national average after the program began, indicating that they filled empty seats.

One would expect to see a smaller effect on a larger transit system, like Milwaukee. After partnering with the University of Wisconsin at Milwaukee and with Marquette University, Milwaukee's total ridership increased by about three percent, and the operating costs declined a little bit. Of course, one cannot expect a university transit pass program to solve all the problems, but it does offer some innovative ideas for partnering.

Shoup reported that more and more universities are pursuing these programs. Since 1997, six to eight new programs have begun, and the Chicago U-Pass program was formed for 20 colleges. UCLA also has partnered with Santa Monica Blue Bus, the top-ranked bus system in the U.S.

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And three of the other five top-ranked bus systems (Champaign-Urbana, Santa Barbara, and Milwaukee) have unlimited access programs.

So if such programs are good for universities, and transit agencies, why don't more agencies offer this? Obstacles include institutional barriers, start up costs, and lack of awareness and knowledge about such options. University transportation departments also are typically parking services, and therefore reluctant to offer free alternatives to what they sell.

UCLA's BruinGo program with Santa Monica Blue Bus uses magnetic swipe cards, issued by the university, that double as a student identification card and a bus pass. This technology allows the agency to post-bill the university and collect information on origins and use patterns.

The objectives of UCLA's program were threefold: to increase public transit ridership to campus, reduce vehicle trips to campus, and reduce parking demand on campus. The program has been in effect for one year as a pilot, and preliminary results are promising. The university has excellent surveys of faculty and staff ridership because SCAQMD surveys are taken every year; we have 2,000 surveys and a 93 percent response rate -- which allows us to be confident that the results are representative.

Transit ridership by faculty and staff in just the morning peak increased by 93 percent, and vehicle trips fell by six percent. There were 828 fewer vehicle trips to campus per day, and campus parking demand reduced by 828 spaces. The transit mode share for UCLA faculty and staff declined every year from 1995 year until BruinGo was implemented in 2001. BruinGo eliminated 273,000 faculty and staff vehicle trips to campus, and each trip averages about 8.8 miles per trip, resulting in a total reduction of 2.4 million VMT, as well as reduced vehicle emissions.

Including students, faculty and staff, 68,000 people at UCLA are eligible to ride transit for free. Between 2000 and 2001, commuters arriving by public transit increased from a little over seven and a half percent to 13.1 percent. Five and a half percent of everyone coming to UCLA shifted to bus, which is a 73 percent increase in the number of people who rode the bus.

Drive alone share fell slightly after BruinGo but the number is significant because so many people drive. Carpool and vanpool shares declined as a whole, but taken individually, vanpool share increased and carpool share declined. Bicycle share remained the same, but walking share increased. Many people reported that they walk partway and take the bus the rest of the way, or they walk on good days and take the bus on rainy days, or they walk to campus in the morning and bus home at night. This was a surprising result.

UCLA pays 45 cents per ride, instead of a blanket fee. The university receives a bill at the end of every month. Over a year, the cost is ten dollars per person at UCLA. This program reduces parking demand, vehicle travel and emissions, and saves money for staff, faculty, and students. The cost of a new parking space including debt service is about \$2,517 per year, and because BruinGo reduced demand by 828 spaces, that is \$2,085,000 saved -- three times the cost of the program itself. The parking demand reduction benefit alone more than paid for the program, which cost \$673,000.

Shoup recognized the program manager, **Jane Gould**, UCLA Transportation Services. He concluded by reiterating that the program is a creative, low cost way to take advantage of excess capacity. Such programs give students the opportunity to travel to places they otherwise might not, to live without cars, or save on high parking fees on campus.

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DISCUSSION

One participant asked **Shoup** what he thought the elasticity or increase in demand would be if a large transit agency like San Francisco Muni went totally fare free? **Shoup** responded that he could not answer that question because he is not a proponent of fare-free transit. Unlimited access is not free transit, but rather a way to provide demand-side subsidy to a group that is willing to pay for public transit. It is a self-financed improvement that requires no public subsidy and no requirement for gas, sales, or property taxes. The participant postulated a scenario where associated residents and employees voted to assess themselves at \$18 a year for unlimited access on Muni. **Shoup** responded that the existing service would probably be swamped and would then deteriorate.

Greg Harper, AC Transit, commented that AC Transit is trying to duplicate the Metro Rapid program. He asked **de la Loza** whether he had a schedule or a method for prioritizing the schedule for the new lines, and whether he predicted the transition from Phase I to II would be smooth.

de la Loza responded that the beauty of bus rapid transit is that it can be improved incrementally. The greatest challenge is implementing 24 hour exclusive bus lanes, and in the course of establishing this and overcoming public opposition the agency can consider first establishing peak hour exclusivity, and in specific segments where bunching is a problem. **de la Loza** added that there are specific places like the Westwood area on the Whittier-Wilshire line, but the agency plans to improve this segment incrementally, and corridor-by-corridor.

Daniel Fleishman, Multisystems, Inc., commented that it is interesting how many ideas with demand responsive systems are taking 20-30 years to reach fruition. He asked **Shaheen** to comment on why she felt this development is taking hold now. He offered some hypotheses that car makers are trying to demonstrate their technologies, or tap into new markets.

Shaheen responded that clearly there is a trend. She suggested that the technology is ripe, but it is not the auto industry driving the movement as much as it is the people driving the movement. Many users say that they are frustrated with parking hassles and congestion, and they are looking for alternatives. The people have this interest, and the auto industry is responding, and interested in bringing new features into their products. Also, if Honda can get you as a customer at age 18 by using the car sharing service, you might buy a Honda when you can afford one. This is a long-term relationship marketing approach. The timing is also right because there is the potential California regulatory mandate that will push resources into the shared vehicle arm, and possibly jump start the market.

Catherine Showalter, RIDES, Inc., added that communication links are the main contributions of technological advances, and they are providing people with information to make choices, whether it is about the BruinGo, CarLink, or walking or transit options. This increase in communication may also explain why programs like CarLink are now becoming more and more popular.

Mark Brucker, EPA, offered a different perspective on car sharing. Although he agreed that the technology is easier now, the present day car sharing programs like those in the San Francisco bay area also received a lot more support from both public and private sectors than in the past. San Francisco City made space available for these vehicles, and the private sector that has provided free parking spaces also make a big difference. None of this was available 20-25 years ago. There is more interest in it and more infrastructure support, which makes this much easier today.

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Jerilyn Mendoza, Environmental Defense, commended **de la Loza** and the MTA for its work on developing Metro Rapid. Transit advocates in Los Angeles are excited about it, and the use of CNG buses is encouraging. She then directed a question to **Shaheen**, about insurance procedures.

Shaheen responded that this is always the nightmare question. Insurance is an important component to a successful program. Most of the car sharing programs receive their insurance through a provider called Insurance One. It is very expensive, and puts a damper on the business potential. For CarLink members, applicants must submit to a DMV and credit check. If everything is good, CarLink will provide an insurance package through Honda for the person and for the whole household. One of the big issues for this fledgling industry is whether car sharing organizations across the country can work together to produce scale and drive some of the insurance costs down. Some car sharing organizations are paying \$1,800-2,000 a year per car. CarLink vehicles have very few scratches, but a lot of the antennae are snapped off for unknown reasons. Several car sharing organizations also do not have smart technology, and their vehicles have actually been stolen.

SESSION 12: PUTTING IT ALL TOGETHER: CLOSING THOUGHTS ON REINVENTING TRANSIT

LeRoy Graymer (Moderator), UCLA Extension

Mortimer Downey, Principal Consultant, PbConsult, Washington, D.C. and former deputy secretary, U.S Department of Transportation

Mortimer Downey first thanked **LeRoy Graymer**, **Joanne Freilich**, and **Brian Taylor** for putting together a great symposium. He felt the symposium presented a well-balanced and timely discussion of transit. The industry is again entering debate about the TEA 21 re-authorization due in two years. Next year will be an election year, and the following year of legislative action will likely shine attention on the subject.

In summarizing the symposium, **Downey** said that there is no shortage of views or of data in answering the question about how transit should be used to deal with many of our communities' pressing issues. **Brian Taylor**'s introductory point about realistic expectations was one of the most important points of this symposium. The industry wants to neither overestimate nor underestimate transit's potential. **Downey** called for more incentives to do better jobs, combined with a sense of realism about what can be accomplished.

Discussions surrounding the issues varied. Academic participants viewed the issue from historical perspectives, starting from 100 years ago, but **Downey** pointed out that many of them seldom touched upon the present. Data presented were no more recent than 1995, and while that is acceptable, much more needs to be done. In contrast, transit managers focused heavily on the present, driven by their duties to create workable systems and to meet their boards' expectations. They expressed satisfaction with the jobs they have done over the last five or six years, which have clearly been improvements from the past, but are struggling with the future that they must face. Many other participants saw transit as a tool for meeting other social, environmental, and economic goals, and they were focused on the future without having looked enough at the past or the present.

Downey pointed out that one voice that was missing was that of elected officials, who could present a very useful fourth perspective. Why are elected officials so optimistic about what transit can do? They are authorizing and providing a lot of money, and they should have reasonable expectations about the returns.

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He noted that many participants talked about the issue from national or global policy perspectives, but **Downey** quoted Tip O'Neil – that “all politics are local” – and the same is true for transit. All corridors, all service patterns, and all decisions are local. The hope is that policies are national, but good decisions must be based on good local facts. Another perspective beyond the national and the local is the individual. There were lively discussions about the people who are or are not using transit, the incentives to attract non-users, and equity issues.

Don Pickrell's paper, as presented by Brian Taylor, discussed small increases in the cost of labor, and this may be because there is more competition, or because transit managers are in fact making better labor-oriented management decisions. There certainly will be debate about who gets the rides and where dollars should go. The question is whether we are putting the service in the right places.

Downey was optimistic about **Richard Steinmann**'s presentation, and commended the FTA for showing maturity in its mission, asking questions about what the industry is providing, examining what the money is producing, and measuring outcomes rather than outputs. **Downey** reiterated **Steinmann**'s view that it is not the number of miles of tracks that matter, but who is using them, and their purpose. Mobility is a reasonable purpose, as are congestion reduction, and social and environmental benefits. The industry must critically look at each of those purposes and evaluate whether we are meeting the objectives.

All arguments for or against transit investment deal with goals like the environment, energy, land use changes, and development directions. But regardless of these competing interests, all success indicators relate to ridership. **Downey** reiterated that it is ridership that counts, and policies are needed to focus on and attract new riders. He observed, however, that to his knowledge there are local surveys measuring ridership and distribution of benefits, but no national surveys to measure ridership and which riders are benefiting. **Downey** felt that we should not only focus on the six percent of the market share today, but must consider the much larger portion that can be encouraged to use transit when it works for them. We must go after those people who, as **Donald Shoup** has found, are willing to pay for the access.

The discussion of marketing and pricing at the symposium rightly focused on the importance of ridership and useful strategies for getting more riders. Again, this is where global and local decisions must be examined in the context of individual decisions. Equity issues are important, not only in the distribution of benefits and costs, but whether subsidies are well-aligned with stated public purposes. We heard conflicting advice – from Michael Townes who must run a system and make fares simple to users, and from others who argue that fares must be tailored to raise money and give incentives. And some good comparisons can be found in the airline industry with complex fare systems. **Downey** felt that with technology, there is no reason to not pursue these incentives. He was hopeful, also, that technology could bring down costs of delivery and lower fares.

Pete Fielding's discussion showed that there are opportunities to increase ridership with marketing strategies aimed at various sub-populations. **Daniel Fleishman**'s presentation of technology options gives some insight about how to introduce more flexible pricing.

Again, **Downey** turned attention to the issue of great expectations, and how much can be expected of transit. Is it the magic bullet to solve all the problems of American cities, improve the environment, save energy costs, and cure the common cold? Given that our country's gross domestic product is \$7.5 trillion and the federal government invests about \$7 billion in public transit – one tenth of one percent, is that enough leverage to make the kinds of differences that

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some people expect? **Downey** does not think so, but does believe that it can still make a difference.

Downey recalled that **Reid Ewing** disclaimed the idea that simple urban design measures can transform a region and its travel patterns, but that a more ubiquitous network across a region coupled with sound local planning can leverage some investment. **Anastasia Loukaitou-Sideris** presented evidence that the Los Angeles Blue Line alone could not make a difference in developing its corridor. However, the Blue Line shows good signs of ridership. Similarly, other actions and coordinated polices must support transit if it is to achieve the development objectives that many hope for.

Throughout the symposium, there was a clear hope for incremental progress. **Therese McMillan**'s discussions about the MTC's efforts, for example, showed that although they were modest investments, they were precise jump-starts. They are also long term investments and we need to frame them in appropriate time frames. Realism was also apparent in discussions about the environment. Cars have gotten much cleaner, and buses will have to catch up if they are going to remain an environmentally-sound way to move people. **Downey** expressed some concern that agencies not give up on incrementally cleaner diesel buses; if we wait until 2008 to put alternative fuels clean buses on the road, there will not be many riders left. Clean technology breakthroughs can change the equation, but **Downey** argued that operators must continue to maintain an efficient fleet that uses available fuels if in fact we are going to deploy newer cleaner buses as well. Aside from the environmental issue of automobile use, he said we cannot continue to build unlimited freeway capacity so we need new ideas and continued reliance on transit.

Discussions about transit's role overseas opened up some new ideas, some of which pull in opposite directions. **David Bayliss** reported that transit in the UK is similar to the systems in the US, but the UK environment is friendlier to transit in terms of development patterns and fuel costs. **Bayliss** suggested that with a different organizational structure, and greater incentives and priorities, transit in the U.S. can do an even better job. **Robert Cervero**'s presentation on the Curitiba bus network and some innovative paratransit systems in developing countries have promises here in the U.S.

The last morning's panels showed us some ways that transit could be further enhanced. Technology as a means for supporting innovation is a real prospect, because technology today is being developed for a broad scale of purposes. When transit set out to accomplish tomorrow's transportation, the industry was first asked to invent the technology before applying it. Today, with platforms, we have more opportunities to let ideas and applications emerge.

Today's transit can be innovative, and was also seen in some local examples. The Los Angeles County MTA, once rightly criticized for its unresponsiveness and poor decisions, has now become nimble, incrementally creative, and service-oriented. **Downey** asked agencies to remember network economics – that as you add more connections and lines, the value of the entire system grows.

Downey urged participants to continue dialogue about outcomes we can agree upon, before we debate the policies that produce those outcomes. The skepticism and realism heard throughout the symposium is useful in that it recognizes that transit is neither a panacea nor the invention of the devil. It is a tool, but we need to decide how to use it, and how to use it in innovative ways. **Downey** disagreed with **Roger Teal**'s assertion that government entities cannot be entrepreneurial. One of the most non-risk-taking agencies in the world is the U.S. Department of Defense, but it funds innovative research and development. While many do not pay off, many

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others do. **Downey** believes that we need to create the circumstances where public agencies can facilitate innovation.

LeRoy Graymer closed with a few remarks for future direction. One of the planning group's objectives for this symposium was to include people from the operating, academic, private, and policymaking environments; he thanked everyone for their participation. He added that sometimes public officials feel besieged by the analyses of optimal outcomes, and recognized that for public officials, optimization means satisfying a wide range of constituents. He encouraged participants to recognize and appreciate the fact that public officials do courageous things and also take risks. While they are not optimizing against economic models, they are trying to make the political and policy world work. **Graymer** encouraged public officials to share their observations so researchers can better contextualize their analyses, and understand which issues are important.

In addition to the risky environment of reelections, officials – appointed or elected – operate in environments where they juggle ten to 20 bottom lines. They are concerned with social justice, environmental protections, connecting species through roadways, and providing rides regardless of how densely or sparsely settled the area may be. This is a steep challenge, and he noted that if the public sector is not capable of being entrepreneurial, its role could be one of *enabling* entrepreneurial activity. **Graymer** recognized that not every idea can come from the public sector, nor can public leaders make every decision about the allocation of resources in an optimal way. He encouraged public officials to think about the enabling function, rather than merely the purse function.

III. CONCLUSIONS

The “Redefining, Reevaluating, and Reinventing Transit” Symposium produced informative and lively discussions covering the many difficult issues facing transit practitioners, operators, planners, researchers, and policymakers.

The symposium opened with a provocative question about whether decision-makers, planners, environmentalists, and transit operators make realistic demands of public transportation and its ability to solve a wide range of problems. In addition to providing mobility, transit is also expected to play a major role in improving environmental quality, equalizing social disparities, reducing poverty, conserving natural habitats, reducing congestion, offering an alternative to driving, meeting needs of transit dependents, stimulating economic development, and catalyzing compact land uses. While there was general consensus that transit is a vital component to our communities, participants presented a wide array of approaches, assumptions, and visions for defining the role of transit today and in the future.

Additionally, all participants agreed that subsidies have certainly helped to maintain ridership levels, but there was debate over whether these subsidies have been productive in meeting the wide array of expectations. Although the industry-wide ridership growth during the late 1990s is encouraging, transit continues to lose its market share of all metropolitan travel. As urban and suburban areas have been growing, transit networks have also been providing coverage to more outlying low-density and rural areas; but with limited resources, these new services have been spread thinly in these new areas, and sometimes at the expense of providing services to older, denser urban cores. Participants debated the effects of federal transit subsidies and whether they were a fair way to reevaluate transit efficiency. One argument proposed concentrating service where it was needed most, where land use is dense, where transit dependency is high, and where transit can operate with fewer subsidies. This “biggest-bang-for-the-buck” approach was contrasted with the current practices of allocating transportation dollars in a spatially even manner, regardless of the differential levels of ridership, density, and cost efficiencies.

One provocative presentation compared transit subsidies and automobile subsidies, as another way to evaluate transit. The study found that national per passenger mile subsidies are higher for transit— even considering social and environmental costs — than for automobiles. Still, other participants felt that transit produces other unaccountable benefits for society.

Most participants agreed that measuring transit’s outcomes, rather than its outputs, is a better way to evaluate transit. This requires a change from the traditional approaches of evaluating the number of rail miles, for example, to measuring transit’s ability to reduce congestion and improve air quality. The question should focus on how well transit can meet its public policy goals, rather than whether it is being provided or consumed in large quantities.

One issue was clear throughout the symposium and received wide consensus -- that transportation needs are changing geographically and demographically, and transit agencies must seek out new markets and reinvent their services to meet changing needs. Some participants took a historical perspective to examine how transit’s role has changed over time, and the problems that the industry has faced and continues to face. Given the financial stresses of strict labor laws, rising automobile competition, and uneven transit consumption by time of day, direction of travel, and day of week, transit is a distressed industry and must seek out new markets. One way to do that is to find populations that are willing to pay for the service, and who tend to ride when transit agencies have excess capacity. One example was unlimited access programs with universities and colleges.

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Other participants highlighted the fact that high ridership is needed to realize the environmental benefits of transit, especially in the context of new technology and higher standards of emissions controls for automobiles. Transit must carry riders to be effective and to produce environmental benefits for society.

And agencies reported tremendous efforts to provide the high quality of service to attract choice riders to transit by providing commuter rail services, heavy rail services, light rail services, and fixed-route express bus services. In Los Angeles, the Blue Line has gained a large ridership, and the Metro Rapid Bus with signal prioritization has been a great success in this arena. San Diego reported success in its marketing efforts, and restructuring geographic and time connections to improve services.

In addition, the emergence of technologies – such as automatic vehicle dispatching for demand-responsive service and car-sharing programs, traffic signal control systems that prioritize buses, electronic fare cards, and wireless internet and palm pilots – increase transit's potential to attract and maintain riders. These technologies increase the quantity and better the quality of service, by providing users with information, allowing complex scheduling and programming, offering flexibility and new payment options, and making transit more convenient. In these ways, transit can compete better with auto ownership and single occupancy use.

Several other presentations highlighted other countries' successes in accommodating non-automobile modes. Europe has effectively promoted denser and more mixed-use development, limited sprawl, and controlled congestion and air quality. Curitiba, Brazil and Ottawa, Canada have been successful in building good transit systems along urban corridors through land use and pro-transit and automobile-pricing policies. Developing countries also have shown that entrepreneurial providers can serve niche markets responsively and effectively. The U.S. can learn much from these countries, and with careful assessment of social, economic, political and institutional conditions, adapt them to the U.S. environment.

Others felt that in order to reinvent transit, agencies and local governments must become more creative and entrepreneurial. There was lively discussion about whether government *can* be entrepreneurial. If not, governments and public agencies should at least create conditions that facilitate and enable innovative competition and entrepreneurialism.

Another presentation argued that to better understand and meet transit users' needs, we need to change the way that researchers, practitioners, and policymakers understand and talk about poor people and welfare recipients. Only by changing the discourse and views of their needs, can we better serve their needs and provide equitable transportation services.

Creating partnerships and coalitions is another way to reinvent transit. Presentations highlighted how transit agencies, other government agencies, professional associations, non-profits, and public interest and advocacy groups have been partnering to bridge the larger framework of transportation, land use, and environment. Discussions about streamlining environmental impact studies and the importance of community and site planning demonstrated that federal, state, regional, and local initiatives play major roles in transit, but must be supported by local policies and planning to be effective.

Throughout the discussions, there was little doubt that transit plays a substantial role in the U.S. economy and society. However, while transit practitioners, researchers and operators focus on the quality of transit provision, elected officials and policymakers must balance many competing needs and address their constituents' demands. It is therefore vital to incorporate policymakers' perspectives into research questions, and to introduce research findings into elected officials'

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agendas. Practitioners and operators also heighten the awareness of the industry's challenges, and the feasibility of solutions and programs.

This symposium created an important opportunity to incorporate all these perspectives, and the dialogue that ensued hopefully will stimulate future new directions for transit in the context of transportation, land use, and the environment.

APPENDIX A:

SYMPOSIUM PROGRAM

REDEFINING, REEVALUATING & REINVENTING TRANSIT THE TRANSPORTATION/LAND USE/ENVIRONMENT CONNECTION
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<i>October 14-16, 2001</i>

<i>UCLA Conference Center at Lake Arrowhead</i> 850 Willow Creek Road Lake Arrowhead, California
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SUNDAY AFTERNOON, OCTOBER 14, 2001

1:30 pm **REINVENTING TRANSIT: INTRODUCTION AND SYMPOSIUM OVERVIEW**

This opening presentation outlines the questions to be explored in sessions to follow: What are the operational, fiscal, and political challenges facing transit systems today? What will it take to overcome these challenges? What opportunities for transit are offered by changing demographics and new technologies? How can transit systems balance efficiency, effectiveness, and equity objectives? What can we learn from transit innovations elsewhere about the best ways to reinvent transit? Can we develop new forms of transit to work effectively where traditional fixed-route systems do not?

Brian D. Taylor, Associate Professor of Urban Planning and Director, Institute of Transportation Studies, UCLA School of Public Policy and Social Research

2:00 pm **LOOKING BACK, LOOKING AHEAD: THE CHALLENGES TO TRANSIT'S RENEWAL**

The evolution of transit is examined with an eye toward the future by addressing the following questions: What are the nature and extent of transit services in California and the U.S. today? What kinds of services are offered? How have these services changed over time? How does transit patronage vary from place-to-place, for different kinds of trips, and at different times of the day and week? How have modern transit systems been shaped by the private, for-profit origins of the industry? And finally,

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what political, managerial, and operational challenges lay ahead in reinventing transit for the century ahead?

Moderator: Joanne Freilich, Director, UCLA Extension Public Policy Program

Transit Today: An Overview of Current Transit Service Types and Usage

Celia Kupersmith, First Vice Chair, American Public Transportation Association (APTA) and General Manager and CEO, Golden Gate Bridge, Highway and Transportation District

The Evolution of Urban Public Transit and the Challenge of Renewal

David W. Jones, Jr., Transportation Consultant, San Geronimo, CA

3:15 pm Break

3:30 pm **HOW CAN WE BEST MEASURE THE COSTS AND BENEFITS OF TRANSIT?**

Public expenditures on transit are large and growing in California and across the U.S. But while protracted debates over the geographic distribution of public funding for transit services are commonplace, planners and policymakers tend to devote less time and attention to analyzing which transit investments are best, or how much public investment in transit should be made vis-à-vis streets and highways. This session examines the costs and benefits of transit. How do we measure trends in transit performance? How do we evaluate transit investments? And how do the costs, benefits, and subsidies of transit and private vehicles compare?

Moderator: Brian Taylor, UCLA

The Anatomy of Costs, Deficits, and Subsidies in Public Transit

Brian Taylor, UCLA

Measuring Transit Performance and Evaluating Transit Investments

Richard Steinmann, Acting Deputy Associate Administrator for Budget and Policy, Office of Policy Development, Federal Transit Administration, Washington, DC

Comparing Full-Cost Accounting of Private Autos and Public Transit: Sorting Out Costs, Benefits, Subsidies

Mark DeLucchi, Associate Researcher, Institute of Transportation Studies, UC Davis

Investment Decisions and Cost-Effectiveness Arguments: A Report from the Field

Arthur T. Leahy, Chief Executive Officer, Orange County Transportation Authority

Discussion Among All Participants

5:15 pm **Check-in and Opening Reception**

6:30 pm **Dinner**

SUNDAY EVENING, OCTOBER 14

7:45 pm **JUST TRANSIT? TRANSIT DEPENDENTS, CIVIL RIGHTS, AND TRANSIT POLICY**

Public debates over the allocation of transit service are not new. But in recent years civil rights organizations, environmental justice activists, and advocates for the poor around the U.S. have argued – at public meetings and in court – for a redeployment of transit resources and restructuring of transit fares on behalf of the poor, minority, disabled, and other transit dependents. Such transit justice arguments have put many transit policymakers and managers in uncomfortably defensive positions, and have added new wrinkles to transportation planning processes. This session examines transit’s important and evolving role in providing mobility for those with little or no access to autos. How can we better meet the mobility of access-deprived people?

Moderator: Martin Wachs, Director, Institute of Transportation Studies, and Professor of City & Regional Planning and Civil & Environmental Engineering, UC Berkeley

Conflicting Constituencies: The Struggle to Serve both Transit Dependents and Choice Riders

Brian D. Taylor, UCLA

How Do Poor People Get Around? Implications for Reinventing Transit

Paul Ong, Director, Lewis Center for Regional Planning Studies and Professor of Urban Planning, UCLA

Putting Transit Justice in Perspective: Planning for Transportation Equity in the 2000s

Jeff Hobson, East Bay Coordinator, Bay Area Transportation and Land Use Coalition

Commenter:

Michael Townes, Executive Director, Transportation District Commission of Hampton Roads, Virginia

Discussion Among All Participants

9:30 pm **Informal Reception and Continued Discussion**

MONDAY MORNING, OCTOBER 15

7:30 am Breakfast

8:45 am **HOW CAN WE MAKE TRANSIT WORK IN CALIFORNIA?**

Brian Smith, Deputy Director, Planning & Modal Programs, California Department of Transportation

9:15 am **MATCHING AND SELLING TRANSIT TO EMERGING MARKETS**

Over the past century, transit systems have lost most of their customers to the private automobile. But transit's market share has not declined uniformly for all trips; some "markets" – like downtown commuters and transit dependents – remain strong, while others are potentially important, but remain unexploited. Understanding the emerging markets for transit can allow operators to customize service to better respond to customer needs. Further, the marketing of transit – both in how transit is presented to the public and sold to users in the form of fares – could change radically in the coming years in response to changes in both technology and the markets for transit.

Moderator: Donald Shoup, Professor and Chair, UCLA Department of Urban Planning

Transit Markets of the Future

Gordon J. “Pete” Fielding, Professor Emeritus of Social Sciences,
UC Irvine

Innovations in Fares and Marketing Strategies

Daniel Fleishman, Principal, Multisystems, Inc., Cambridge, MA

Commenter:

Tom Larwin, General Manager, Metropolitan Transit Development Board
(MTDB), San Diego

Discussion Among All Participants

10:45 am **Break**

11:00 am **TRANSIT AND LAND USE: EVALUATING THE CONNECTIONS**

Transit plays a central role in what critics of sprawling suburban development have come to call traditional town planning, new urbanism, compact development, and smart growth. “Transit-oriented development” (TOD) is now a firmly established part of the planning lexicon; its principles have been incorporated into local land use regulations around the U.S., and dozens, even hundreds, of new TODs – ranging from single-parcel projects to enormous new-town developments – are now occupied and functioning. This session moves past speculative debates over the merits of compact development and sprawl by focusing on research evaluating the links between land use planning and transit usage: Have efforts to encourage compact, transit-oriented development meaningfully shifted travelers from private vehicles to transit, biking, and walking? If so, how? And if not, why not?

Moderator: Jonathan Levine, Associate Professor of Urban & Regional Planning, University of Michigan

Evaluating the Transit-Land Use Connection: What Does the Research Tell Us, and What are the Implications for Planning?

Reid Ewing, Research Professor and Acting Director, Vorhees Transportation Center, Rutgers University

Transit-Oriented Development in American Inner Cities: Opportunities and Constraints?

Anastasia Loukaitou-Sideris, Professor of Urban Planning, UCLA

Transit for Livable Communities: A Helping Hand Using Regional Incentives at the Community Level

Therese McMillan, Director of Policy, Metropolitan Transportation Commission, Oakland

Commenter:

Ellen Greenberg, Director of Policy and Research, Congress for New Urbanism

Discussion Among All Participants

12:30 pm **Lunch**

MONDAY AFTERNOON, OCTOBER 15

1:45 pm **GREEN TRANSIT: TRANSIT AND ENVIRONMENTAL QUALITY**

From visionary calls for a sustainable future, to specific plans for air quality compliance, transit is usually a part of environmental planning efforts. Transit systems are frequently proffered as important alternatives to resource- and emissions-intensive private vehicles. A variety of cleaner propulsion technologies have also been developed to clean-up transit's largely diesel fleet. In a roundtable panel discussion, this session explores both the potential and limits of efforts to make transit a central part of green mobility and environmental quality in the coming decades. Besides environmental benefits, what are potential environmental costs of transit projects?

Moderator: Joanne Freilich, UCLA Extension

Tom Cackette, Chief Deputy Executive Officer, California Air Resources Board

Mike Davis, Principal, Environmental Planning Group, Jones & Stokes, Oakland CA

Madelyn Glickfeld, Assistant Secretary, California Resources Agency

James Ortner, Manager, Transit Technical Services, Orange County Transportation Authority

Discussion Among All Participants

3:15 pm **Free Time**

5:30 pm **Reception**

6:30 pm **Dinner**

MONDAY EVENING, OCTOBER 15

7:45 pm **LESSONS FROM ABROAD: WHAT U.S. TRANSIT SYSTEMS CAN LEARN FROM THE DEVELOPED AND DEVELOPING WORLDS**

“Why can’t we have transit like this in the U.S.?” is a frequent question posed by Americans when using public transit while abroad. Rates of transit use tend to be far higher in other developed and developing countries where services are frequent, varied, and heavily patronized. This session examines the provision of transit in cities around the world, with an emphasis on the lessons to be gleaned from other countries. What roles do land use, parking, and tax policies play in explaining differences in transit use? Why do some cities in developing countries have such a diverse array of inexpensive transit services? How have some cities deployed high-speed, high-capacity transit systems at relatively low cost?

Moderator: Gordon J. “Pete” Fielding, UC Irvine

Lessons from Europe and Canada

David Bayliss, Director, Halcrow Consulting, United Kingdom

Lessons from the Developing World

Robert Cervero, Professor of City and Regional Planning, UC Berkeley

9:30 pm **Informal Reception/Discussion**

TUESDAY MORNING, OCTOBER 16, 2001

7:30 am **Breakfast**

8:45 am **TRANSIT SERVICES FOR THE NEXT GENERATION**

Metropolitan areas in California and, indeed, most of the rest of the world, continue to disperse as they continue to grow. Each year more people use private motor vehicles more often. Does transit have a future in the increasingly dispersed, auto-oriented cities and suburbs of the future? If so, what will new, successful transit services of the future look like? How can they compete effectively with the door-to-door service provided by automobiles? How can new transit services work effectively in low density settings where traditional fixed-route transit services do not? Finally, are there examples of innovative services in place today that hold promise for the future?

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Moderator: Melvin Webber, Professor Emeritus, Department of City & Regional Planning, UC Berkeley

Making Transit Function More Like Automobiles: Taxis, Paratransit, Private Shuttles, Ridesharing, and New Technology

Roger Teal, President, TWJ Consulting, Wilmette, IL

Development-Oriented Transit: Smart Jitneys, Smart Communities

Robert Behnke, President, CO-WIN, Inc. Portland, OR

Technology and Decentralization: The Potential of and Limits to Transit Services in Low-Density Environments

Jonathan Levine, Associate Professor of Urban & Regional Planning, University of Michigan

Discussion Among All Participants

10:15 am **Break**

10:30 am **PULLING IDEAS TOGETHER AND PUTTING THEM INTO PRACTICE**

The symposium closes with three short talks on current efforts – both large and small – to put many of the ideas and concepts presented in previous sessions into practice. This sampling of current, creative efforts to reinvent transit in both urban and suburban areas is intended to stimulate ideas and a lively closing discussion among participants.

Moderator: Brian Taylor, UCLA

The Metro Rapid Bus Program in Los Angeles

James de la Loza, Executive Officer, Countywide Planning and Development, Los Angeles County Metropolitan Transportation Authority, Los Angeles, CA

Bay Area Station Car Programs

Susan Shaheen, Research Scientist, Partners for Advanced Transit and Highways (PATH) and ITS Davis, and Model Integration Specialist, Caltrans

Unlimited Access: A New Way to Pay for Public Transit

Donald Shoup, UCLA

Discussion Among All Participants

11:45 am **PUTTING IT ALL TOGETHER: CLOSING THOUGHTS ON REINVENTING TRANSIT**

What have we learned? Where should we be headed? And what are the next steps? The symposium concludes with closing thoughts by a senior official involved in transportation planning and management.

Moderator: LeRoy Graymer, UCLA Extension

Mortimer Downey, Principal Consultant, PbConsult, Washington, D.C. and former deputy secretary, U.S Department of Transportation

12:15 pm **Concluding Lunch
Steering Committee Meeting**

APPENDIX B:

SPEAKER BIOGRAPHIES

David Bayliss is a transport engineer who has spent most of his working life in public service. Starting his career in Manchester, England he joined the Greater London Council where he became Chief Transport Planner. Subsequently as Director of Planning for London Transport he was responsible for introducing competition to the London bus market and the planning of the Docklands Light Railway, the Extension of the Jubilee Line, and the Croydon Tram System. He is now a Director of Halcrow Consulting, and is Chairman of the European Commission's Advisory Group on Sustainable Mobility. In 1999 -2000 he was a member of TRB's Committee for an International Comparison of National Policies and Expectations Affecting Public Transit.

Robert Behnke has 40+ years experience in operations research and systems engineering. The first 20 were focused on military command and control applications. The past 20+ have been focused on transportation and community (including traveler) information systems for FHWA, FTA, Caltrans, other state and local government agencies, and private organizations. He has received U.S. and Canadian patents on a smart jitney, or single-trip carpooling system and was a founding member of ITS-America and the Community Transportation Association of America. He is currently president of CO-WIN, Inc. in Portland, Oregon.

Tom Cackette is Chief Deputy Director of the California Air Resources Board. He manages all aspects of the Board's motor vehicle emission control program, which develops regulations and other programs to reduce vehicle emissions. He also manages the Board's Monitoring and Laboratory Division, which performs ambient air quality monitoring and develops test methods, and the Compliance Division, which provides compliance assistance and enforces fuel specifications and consumer product formulation requirements. Overall, 500 professional and support staff and a budget of \$50 million are dedicated to these programs, which are contributing to a steady decline in air pollution in California's major urban areas. Involved in many aspects of air pollution control since 1974, Cackette has also served as a legislative lobbyist for the ARB, and worked for eight years for the U.S. Environmental Protection Agency Motor Vehicle Emission Laboratory in a variety of technical, management and policy positions. Before that he was involved in rocket engine production and test and flight performance analysis at Rocketdyne in Los Angeles, where he gained first hand knowledge of living in the smoggiest city in the U.S.

Robert Cervero is Professor of City and Regional Planning, University of California, Berkeley. His interests span the areas of transportation and land-use policy and planning, transportation systems development, sustainability planning, infrastructure finance, and comparative international development. He is the author of numerous journal articles and research monographs, as well as five books, including *The Transit Metropolis* (Island Press, 1998); *Transit Villages for the 21st Century* (McGraw-Hill, 1997) and *Paratransit in America* (Praeger, 1997). His current projects include a study of the informal transport sector for the United Nations, an evaluation of car-sharing in San Francisco, urban management training for the World Bank, policy advising to several local and national governments, and research in the areas of induced travel demand, urban form and economic performance, and land-market impacts of transit-oriented development. He is currently a Fellow with the Urban Land Institute, the World Bank Institute, and the Lincoln Institute of Land Policy

Mike Davis is a principal at Jones & Stokes and oversees the firm's environmental planning and review services for transportation projects. He has more than 20 years of experience in environmental planning, transportation planning, community revitalization, and historic

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preservation. Mr. Davis has directed and participated in environmental impact assessments, alternatives analysis, major investment studies, and environmental screening studies for numerous projects. He has participated in Alternatives Analyses/EISs and Major Investment Studies for transit projects in Houston, Dallas, Chicago, Puerto Rico, and Sacramento. He is currently Principal-in-Charge for the Santa Clara Valley Transportation Authority Capitol Expressway Corridor Light Rail Extension and BART Warm Springs Extension projects, and consultant team environmental manager for the Caltrans San Francisco-Oakland East Span Seismic Safety EIS Project. In addition to consulting, Mr. Davis has been a senior environmental planner for municipal planning departments, and a transit agency.

James L. de la Loza serves as Executive Officer for Countywide Planning and Development for the Los Angeles County Metropolitan Transportation Authority (MTA). In this position, he is responsible for all planning and programming including multimodal project development and management, bus transit route planning and scheduling, regional planning, systems integration, fund programming and grants management. The MTA Countywide Planning oversees the implementation of car pool lane programs, bus transit planning, rail planning, and pedestrian/bikeway programs. Additionally, the division is currently working to implement joint development projects at several rail station areas. The joint development projects include the development of low-cost/market-rate housing, public school, commercial/office and entertainment uses totaling over \$1 billion. Before assuming this position, he served as Deputy Executive Officer for Multimodal Planning where he was responsible for MTA project planning and implementation.

Mark A. Delucchi is a research scientist at the Institute of Transportation Studies, University of California, Davis, and a private consultant, specializing in economic, environmental, and engineering analyses of transportation systems and alternative transportation fuels. He is the principal author of a 2,000-page analysis of the social costs of motor-vehicle use, widely regarded as the most comprehensive and detailed motor-vehicle social-cost work in the U. S. in the past 20 years. Dr. Delucchi is a member of the Energy and Conservation Demand Committee, and the Alternative Fuels Committee, of the Transportation Research Board, and a member of editorial board of the *Journal of Transport and Statistics*.

Mortimer L. Downey, III is a principal consultant at PBConsult, a Parsons Brinckerhoff subsidiary providing consulting services to public and private owners, developers, financiers and builders of infrastructure projects worldwide. He has 42 years of experience in the transportation industry, most recently serving eight years as U.S. deputy secretary of transportation. As the Department of Transportation's chief operating officer, he developed the agency's strategic and performance plans and had program responsibilities for operations, regulations and investments in land, sea, air and space transportation. He also served on the President's Management Council, as chairman of the National Science and Technology Council Committee on Technology, and as a member of the board of directors of Amtrak. Previously, He was executive director and chief financial officer of New York's Metropolitan Transportation Authority (MTA). Over a 12-year period, he directed MTA capital programs of \$20 billion, including development of new public and private financing techniques and responsibility for oversight of capital project designs, budgets, schedules and performance. Downey has received numerous professional awards, including election to the National Academy of Public Administration, the Frank Turner Lifetime Achievement Award from the Transportation Research Board, a lifetime achievement award from the American Public Transportation Association, and a Leadership Award from ITS America. He was recently elected to the Board of Directors of the Eno Foundation.

Reid Ewing is a Research Professor at Rutgers University and Research Director of the Surface Transportation Policy Project in Washington, D.C. This year, Reid is also Acting Director of the

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Alan M. Voorhees Transportation Center at Rutgers University, overseeing the National Transit Institute and Transportation Policy Institute. He is the author of *Best Development Practices*, the American Planning Association's top selling book three years in a row; *Traffic Calming State-of-the-Practice*, projected to be one of Institute of Transportation Engineers' top selling books ever based on first-year sales; *Pedestrian- and Transit-Friendly Design* for the Florida Department of Transportation, and *Context-Sensitive Design Standards for Main Streets* for the New Jersey Department of Transportation. He has written many articles on growth management, community design, and traffic management, and speaks and consults widely on these subjects.

Gordon J. "Pete" Fielding is Research Professor of Social Sciences at the University of California, Irvine. He was Systemwide Director of the University of California's Institute of Transportation Studies between 1983 and 1989. And from 1971 to 1975, he served as the first General Manager of the Orange County Transit District where he developed a coordinated bus system including the first paratransit systems in California using private contractors. Between 1976 and 1978 he was a member of the California State Transportation Board. Dr. Fielding is internationally recognized for his research on highway management and the evaluation of transit performance. He is the author of almost 100 professional articles and books on road pricing and transit, including *Managing Public Transit Strategically* (1987). During the 1980's, he pioneered research into transit performance measures and conducted a series of studies on performance in the transit industry. The indicators developed by Fielding are widely used by metropolitan and state planners and by transit agencies. FTA also uses them as the basis for the performance indicators published annually. Fielding has also analyzed performance-based planning in Dallas-Fort Worth, Los Angeles, Portland, San Diego, Seattle, Manchester (UK), Adelaide (Australia), and Vancouver (Canada).

Daniel Fleishman is a Principal at Multisystems, Inc., a Cambridge, MA-based transit consulting firm. In his twenty-four years with the firm, he has participated in a broad range of transit planning and policy studies. Fleishman is currently responsible for the firm's work in the areas of fare policy and technology research, as well as financial analysis. He served as Principal Investigator for the Transit Cooperative Research Program projects on Fare Policies, Structures, and Technologies and Multipurpose Transit Payment Media, and is currently updating the findings of those studies. He is also leading a TCRP study on proof-of-payment fare collection. Dan has led or participated in the firm's efforts in fare policy or technology studies for the US DOT and for transit agencies in Los Angeles, Chicago, Philadelphia, New York City, Boston, New Jersey, St. Louis, Denver, Cleveland, Buffalo, Orange County (CA), Dallas, and San Juan. He is a member of the ITS America Electronic Payment Systems Task Force, and has represented the firm on the Transportation Research Board Fare and Marketing Committee and the Smart Card Alliance's Transportation Working Group.

Joanne Freilich (Symposium Co-Coordinator) is Program Director of the Public Policy Program at UCLA Extension where she develops and implements conferences, seminars, and courses for policy leaders and professionals in areas including: urban policy planning, land use, governance, transportation, economic development, environmental quality, mediation, public infrastructure finance, and international public policy. She has been with the UCLA Extension Public Policy Program for 12 years. She previously served as a principal planner with the Southern California Association of Governments from 1973 through 1989 where she specialized in air and water quality, transportation, and land use planning.

Madelyn Glickfeld serves as Assistant Secretary for the CCRISP program in the California Resources Agency. Prior to her appointment in May, 2001, she was a visiting lecturer at the Institute of the Environment at UCLA, teaching a multidisciplinary graduate course called "Coastal Zone Management in California: Science, Policy, Technology and Politics". She

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continues her association with the Institute and will be establishing a Southern California CCRISP office at the Institute. Glickfeld is an environmental policy analyst and planner by training and has nearly 30 years of experience specializing in California environmental issues from the state, regional and local perspectives. Prior to her appointment, she served as a policy advisor to the Director of the California State Department of Parks and Recreation. She was part of a team that developed the *State Parks: Path to the Future Project*. This included a public workshop process and a Vision Summit for State Parks, which led to a strategic vision for how California State Parks and Recreation need to change to meet the growing and diverse needs of California's population.

LeRoy Graymer (*Symposium Co-Coordinator*) is Founding Director of the Public Policy Program at UCLA Extension, which he established in 1979. The program addresses public policy issues of state, national and international importance through numerous conferences, seminars, workshops, and facilitation activities. LeRoy was formerly Associate Dean of the Graduate School of Public Policy at the University of California, Berkeley, and Vice President and Professor of Political Science at California State University, Dominguez Hills. Recent work includes a special research project for the Hewlett Foundation on California governance reform options.

Ellen Greenberg joined the Congress for New Urbanism (CNU) as Director of Policy and Research in August 2000. She has responsibility for managing CNU's research program, which addresses issues ranging from the re-use of obsolete shopping malls to the design of walkable streets. Prior to joining the CNU, Greenberg spent 15 years as a San Francisco Bay Area planning consultant, specializing in preparation of comprehensive plans and improving the integration of transportation and land use. She has worked in big cities including Oakland and San Diego, in suburban communities around the Bay Area, and in agricultural communities in California's Central and Salinas valleys.

Jeff Hobson is East Bay Coordinator, Bay Area Transportation and Land Use Coalition in Oakland. He helped found the Access to Opportunities project in November 1998 to focus on the transportation needs of low-income communities. He authored *Clearing the Road to Work: Developing a Transportation Lifeline for Low-Income Residents of Alameda County*. He has also provided policy analysis for the Coalition's Transportation Justice Working Group, which brings together representatives of low-income communities and social justice groups to coordinate and increase public participation in transportation decisions. Hobson began chairing the Coalition's East Bay Chapter at its inception in 1999, which spent the next two years as a major force behind Measure B, Alameda County's successful \$1.4 billion transportation initiative. In 1998, a similar measure had split the community: environmental groups opposed its suburban highway expansion projects while social equity advocates supported much-needed transit funding. Under his leadership, the Coalition brought these groups together and secured a \$186 million increase for public transit, paratransit, bicycle and pedestrian safety, leading to a record-breaking 81% Yes vote. Hobson has experience as a policy analyst and an advocate on environmental justice issues regarding transportation and industrial pollution, and has worked in non-profit organizations, a government agency, and the private sector.

David Jones is a consultant specializing in strategic planning for metropolitan transportation. He has served for 10 years as a member of the research and teaching staff at the University of California, Berkeley. While at UC Berkeley, David authored histories of U.S. transit and highway policy. He also developed and taught courses in transportation policy, economics and management.

Celia G. Kupersmith is General Manager and CEO of the Golden Gate Bridge, Highway and Transportation District in San Francisco. She brings to the Bridge District more than 20-years of

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transportation experience that includes street and highway construction, public transportation planning and operations, general aviation airport planning, and rail right-of-way management. As General Manager, she manages a complex organization of buses, ferries, rail right-of-way, and the world's most beautiful bridge. The District is forging new ground with innovative bridge seismic retrofit techniques, electronic toll collection implementation, extensive fast ferryboat operations, and enhanced commuter bus operations. Prior to joining the District, she served as Executive Director of the Regional Transportation Commission (RTC) in Reno, Nevada. A native Texan, Celia Kupersmith earlier served as Assistant General Manager for the Capital Metropolitan Transportation Authority in Austin, Texas and as a transportation planner in Houston, Texas. Active within the transportation profession, she has served on the American Public Transportation Association's Executive Committee and is now on the board of the Norman Mineta International Institute for Surface Transportation Policy Studies, the Transportation Cooperative Research Program's Oversight and Project Selection Committee, and the National Transit Institute's Advisory Board.

Tom Larwin joined the San Diego Metropolitan Transit Development Board (MTDB) in its initial year of service (1976) and has served as its General Manager since 1979. MTDB is the developer of the San Diego light rail system and owner of two corporate entities, San Diego Transit Corporation and San Diego Trolley, Inc. In addition, MTDB owns the San Diego & Arizona Eastern Ry. Co. and regulates taxicabs for most of its jurisdiction. Before joining MTDB, Larwin was a Principal Associate with the consulting firm of Barton-Aschman Associates for 11 years. He is a registered civil engineer and traffic engineer in California, and has been active with the Institute of Transportation Engineers (ITE), Transportation Research Board (TRB), and American Public Transportation Association (APTA).

Art Leahy is Chief Executive Officer of the Orange County Transportation Authority (OCTA), a county-wide transportation agency with over 1,600 employees and an annual operating budget of \$525 million. Under an 11-member Board of Directors, he is responsible for planning, financing, and coordinating Orange County's freeway, street, and rail development; bus service; commuter rail service; paratransit van service for the disabled; and a host of other transportation related programs. From 1971 - 1996 he served in a variety of positions at the Southern California Rapid Transit District (RTD), predecessor agency to the Los Angeles Metropolitan Transportation Authority (MTA). Starting originally as a bus operator, he became Assistant General Manager of Operations, where he orchestrated a successful effort to start light rail service to Los Angeles with the opening of the 23-mile Metro Blue Line in 1990. Leahy was tapped to head the MTA's Operations Division in 1993, where he directed a 6,200-person workforce to provide bus and rail service to over 1.5 million daily transit riders. He helped launch the Metro Red Line in 1993 and Green Line in 1995, and directed MTA's innovative alternative fuels and bus technology programs. In 1997, Leahy moved to Minnesota to become General Manager for Metro Transit in Minneapolis - St. Paul, Minnesota, where he was responsible for the daily operation of a fleet of 930 buses serving 2.5 million people with 245,000 daily riders. At Metro Transit he increased bus ridership in the Twin Cities area by almost 20 percent -- a significant expansion after numerous years of consistent decline -- and played an instrumental role in gaining public support and funding for the cities' Hiawatha light rail project, scheduled to formally open in 2003.

Jonathan Levine is Associate Professor and Coordinator of Doctoral Studies in the Urban and Regional Planning Program of the A. Alfred Taubman College of Architecture and Urban Planning at the University of Michigan. His research and teaching have focused on transportation-land use interactions, public transportation planning, and transportation system evaluation. Additional research and teaching interest include public economics, quantitative planning methods and planning theory. His recent research has been sponsored by organizations including the Michigan Department of Transportation, International Institute for Surface

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Transportation Policy Studies, Ann Arbor Transportation Authority, the Suburban Mobility Authority for Regional Transportation, and the Great Lakes Center for Truck and Transit Research. He recently directed the development of the transit strategic plan for the State of Michigan. His transportation policy research has been published in journals including the *Journal of the American Planning Association*, *Journal of Land Economics*, *Journal of Transportation Engineering*, *Transportation Quarterly*, and *Transportation Research*.

Anastasia Loukaitou-Sideris is Professor and Vice Chair of the Department of Urban Planning at UCLA. Her area of specialization is urban design, physical and land use planning. She has published extensively on issues of transit-oriented design, transit safety, downtown development, inner city revitalization, cultural determinants of design, and open space design. Her work seeks to integrate social and physical issues in urban planning and architecture. Recent and ongoing projects have been funded by the U.S. Department of Transportation, California Department of Transportation, California Policy Research Center, National Endowment for the Arts, Poverty and Race Research Action Council, and the John Randolph and Dora Haynes Foundation. She has served as a consultant to the Transportation Research Board, Federal Highway Administration, South Bay Cities Council of Government, Los Angeles Neighborhood Initiative, the Greek government, and many municipal governments on issues of urban design, land use and transportation. She is the co-author of the book *Urban Design Downtown: Poetics and Politics of Form*, published by the University of California Press in 1998. Her UCLA studio class "Byzantine-Latino Quarter: Creating Community in Los Angeles" received the American Institute of Certified Planners 1999 National Award, the 1998 American Planning Association, California Chapter Academic Merit Award, and the 1998 American Planning Association, Los Angeles Chapter Academic Award.

Therese McMillan is Deputy Director of Policy at the Metropolitan Transportation Commission (MTC) in the San Francisco Bay Area. She oversees MTC's departments responsible for strategic financial planning and MTC's management of federal, state and regional fund sources for transit, highways, roadways and other modes; state and federal legislative advocacy and public affairs and community outreach; planning, including the long range plan and air quality related issues; and finance and budget. Prior to her current position, she was a manager for seven years, most recently as MTC's Manager of Funding and External affairs. She was the President of the San Francisco Bay Area Chapter of the Women's Transportation Seminar (WTS) in 1989 and 1990. She is currently a member of the Transportation Research Board's Committee on Intergovernmental Relations and Policy Processes. She has served on many statewide task forces and working groups addressing various transportation issues. For FY 1998-99, she served as chair of the statewide Regional Transportation Planning Agencies group, a coalition of transportation agencies that advises the California Transportation Commission on issues related to state programming and transportation planning.

Jeff Morales is Director of the California Department of Transportation (Caltrans), where he manages a \$10 billion budget and more than 22,000 employees working to build, maintain and operate the largest state transportation system in the country. Director Morales formally began his duties in June 2000, after serving as Executive Vice President for Management and Performance at the Chicago Transit Authority (CTA). His highest priority is to deliver Gov. Davis' far-reaching plan to cut traffic congestion in the state. He is charged with finding new ways to improve the pace and efficiency of the department's project delivery process. The 2000/01 California State Budget committed \$6.8 billion in new transportation funds, including \$5.3 billion for Gov. Davis' Transportation Congestion Relief Plan. Director Morales has a wide range of experience in transportation and government. At the CTA, he spearheaded major reforms to improve service and increase ridership at the nation's second largest transit agency, resulting in reversing the steady decline in ridership that had prevailed for the previous 15 years. Prior to his

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tenure at the CTA, he was a senior staff member with Vice President Al Gore's National Performance Review, the task force to reinvent the federal government. It has saved taxpayers more than \$130 billion and produced dramatic improvements in the management of federal programs. In 1996/97, he was Issues Director for the White House Commission on Aviation Safety and Security, which laid out a blueprint for a national aviation policy in the 21st century. Director Morales held senior positions at the U.S. Department of Transportation and was on the staff of the U.S. Senate, where he was a principal drafter of the landmark Intermodal Surface Transportation Efficiency Act of 1991.

Paul Ong is Director of the Lewis Center for Regional Planning Studies and Professor of Urban Planning at UCLA. He has done research on the labor market status of minorities and immigrants, displaced high-tech workers, work and welfare and transportation access. He is currently engaged in studies on the effects of neighborhood economies on welfare and work, the role of unions and community-based organizations in work and health policies, race relations among minority groups, and community economic development in Asian American communities. Previous research projects have included studies of the impact of defense cuts on California's once-dominant aerospace industry, the impact of immigration on the employment status of young African Americans, the influence of car ownership and subsidized housing on welfare usage, and the impact of affirmative action in California. He was co-author of a widely reported 1994 study on Asian Pacific Americans, which challenged the popular stereotype of Asians as the country's "model minority" by showing they are just as likely as other groups to be impoverished. Ong is an advisor to the U.S. Bureau of the Census, the California Department of Social Services, the California Employment Development Department, the Wellness Foundation, the Getty Research Institute, and the South Coast Air Quality Management District.

James Ortner is Manager, Transit Technical Services for the Orange County Transportation Authority (OCTA). As manager, he supervises a eight member staff whose primary functions are to oversee the development of specifications and introduction of new buses and bus technology into the OCTA fleet and evaluate performance of the bus fleet. Dr. Ortner is responsible for developing policy on the Authority's low emission bus program, and preparing analyses and policy on the interaction of transportation and air quality issues. Dr. Ortner is also an Adjunct Associate Professor in the USC School of Planning, Policy and Development and a Visiting Lecturer in the UCLA School of Public Policy. He also serves as an advisor to the staffs of the California Air Resources Board and South Coast Air Quality Management District on issues concerning air quality and urban transportation.

Don Pickrell is Chief Economist of the U.S. Department of Transportation's Volpe National Transportation Systems Center, and is also a lecturer in the Department of Civil and Environmental Engineering at MIT. He has been involved in research and policy-making at the U.S. Department of Transportation for nearly twenty years, and previously taught economics and transportation planning at Harvard University. Pickrell has authored over 100 published papers and research reports on various topics in transportation planning and policy, including evaluation of investments in transportation facilities, transit planning and finance, airline marketing and competition, travel demand forecasting, infrastructure pricing and finance, and the relationships of travel behavior to land use, urban air quality, and potential climate change.

Susan Shaheen holds a joint research appointment at UC Berkeley's Partners for Advanced Transit and Highways (PATH) and at UC Davis' Institute of Transportation Studies. Currently, she is also serving as a special assistant, focusing on modal integration, to the Director's Office of the California Department of Transportation. In November 2000, she was honored as the first Honda Distinguished Scholar in Transportation at UC Davis. She recently completed her post-doctoral studies on advanced public transportation systems at PATH. She has over ten years of

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professional experience in transportation and environmental policy. While a doctoral candidate, she designed, managed, and procured funding for major public/private research projects totaling over \$2 million. She also earned a variety of awards, including the University of California Outstanding Graduate Student of the Year, the Dwight David Eisenhower Fellowship, a National Science Foundation Award, an Eno Leadership Fellowship, and a National Air and Waste Management Association Scholarship. She has co-authored one book, eight journal articles, and nearly twenty reports and proceedings articles. Recently, she wrote the introduction to *Cool Careers for Girls in the Environment*. She is also the founding chair of the Carsharing/Station Car Subcommittee of the Transportation Research Board.

Donald Shoup is Chair of the Department of Urban Planning at UCLA. He has a background in both economics and engineering. His research focuses on public finance and transportation, with an emphasis on links to the land market. Shoup has studied the issue of parking as a key link between transportation and land use. As a consultant to the U.S. Department of Transportation, he completed a report on "Cashing Out Employer-Paid Parking," which explains how employer-paid parking increases solo driving to work. As a remedy, he proposed that employers who subsidize employee parking should also offer employees the option to take the cash value of the parking subsidy if they do not take the parking itself. This proposal has since been passed into law in California, and the Internal Revenue Code has been amended to encourage parking cashout. Don has also worked on ways to finance public infrastructure in low-income neighborhoods. His proposal for a new way to use special assessments to finance public services that benefit specific properties led to passage of California's deferred assessment legislation, which enables cities to use deferred special assessments to meet the public infrastructure needs of older neighborhoods.

Richard P. Steinmann is Acting Deputy Associate Administrator for Budget and Policy in the Federal Transit Administration (FTA). His permanent position is Director, Office of Policy Development. He has been serving as Acting Deputy Associate Administrator since January 2001. In that role he directs FTA's Policy Development, Strategic Planning, Financial Management, and Financial Systems functions, including acting as FTA's Chief Financial Officer. He was appointed to the position of Director of Policy Development in January 1996 after serving as Acting Director since August 1995. The Office of Policy Development is responsible for FTA's policy and program development activities, including policy research, assessment of transit investment requirements, developing policy on major transit investments, conducting transit industry analysis, developing legislation, and preparing regulatory analyses. He has been with FTA (and its predecessor, the Urban Mass Transportation Administration -- UMTA) since 1976, serving in the Offices of Planning and Policy. Prior to joining UMTA he worked for an engineering consulting firm in its transportation planning practice.

Brian Taylor (Symposium Co-Coordinator) is Director of the UCLA Institute of Transportation Studies and Associate Professor of Urban Planning in the UCLA School of Public Policy and Social Research. He teaches courses in transportation policy and planning, and urban public policy. His current research is on the politics of transportation finance and planning, including the history of highway finance and the effect of public transit subsidy programs on system performance and social equity. Taylor has also examined the relationships between transportation and urban form, including the effects of suburbanization on employment access and the evolving commuting patterns of women, minority, disabled, and low-income workers. Prior to coming to UCLA, he was an Assistant Professor of City and Regional Planning at the University of North Carolina at Chapel Hill and a transportation analyst for the San Francisco Bay Area Metropolitan Transportation Commission.

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Dr. Roger F. Teal is the President of TWJ Consulting, a software consulting firm based in the Chicago area that is focused upon E-business, scheduling, and survey software. Dr. Teal specializes in leading project teams in the design and implementation of mission critical customized software products. Most recently, he assembled and led a 40 person team that developed an E-marketplace application for a B2B dot com company in the commercial aviation industry. From 1979 to 1989, Dr. Teal was a faculty member in the transportation systems area of the Department of Civil Engineering at the University of California, Irvine. At UCI his research focused on public transit and paratransit innovation, transit service contracting, and urban transportation regulation. Dr. Teal has also served as the president of a company that developed in-vehicle computer systems and applications for the paratransit and taxi industries. He served on the committees of both the Strategic Transit Research Study that developed the TCRP program and the recent National Academy of Sciences-sponsored Study of Contracting Out Transit Services.

Michael S. Townes is Executive Director of the Transportation District Commission of Hampton Roads (Hampton Roads Transit) in Virginia. Upon his arrival at Pentran, one of his first major projects included managing the construction of the \$7.6 million Operations, Maintenance and Administrative facility in Hampton, Virginia, which was awarded Virginia Outstanding Public Transportation System Achievement Award. Nationally, Pentran was recognized by APTA in 1993 with the Public Transportation System Outstanding Achievement Award. In 1996, Mr. Townes was the recipient of two awards including: The Conference of Minority Transportation Officials (COMTO) Executive of the Year award, and the Women in Transit Committee Achievement Award which is a national award given by the American Public Transportation Association's (APTA). In 1998, Townes received the Distinguished Public Service Award from the Conference of Minority Public Administrators (COMPA). He currently serves as the Virginia Transit Association (VTA) Legislative Committee Chairman and as Treasurer of the Virginia Transit Association. Townes has served as the Chair of the TCRP Oversight and Project Selection (TOPS) Committee. As an active member of the Transportation Research Board where he serves on the Executive Committee, he participates on many TCRP Panels and his involvement keeps him well informed of issues relating to transit and technology. As a member of the Advance Public Transit Systems' (APTS) Committee of the Intelligent Transportation Society of America, he has begun to take steps to integrate new technologies into the day-to-day operations of his transit system.

Martin Wachs is Director of the Institute of Transportation Studies at the University of California, Berkeley, where he is also holds faculty appointments as Professor of City and Regional Planning and of Civil and Environmental Engineering. Until 1996, he was Professor of Urban Planning and Director of the Institute of Transportation Studies at UCLA, where he had been a member of the faculty since 1971, and where he served three terms as Head of the Urban Planning Program. Wachs is the author or editor of four books and has written over 140 published articles on transportation planning and policy, including the transportation needs of elderly and handicapped people; fare and subsidy policies in urban transportation; the problem of crime in public transit systems; methods for the evaluation of alternative transportation projects; and ethics in planning and forecasting. Recent research has dealt with the relationship between transportation, air quality and land use, and transportation finance. Wachs has been Chairman of the Executive Committee of the Transportation Research Board and is a member of the Advisory Committee on Research and Development for the California Department of Transportation. He recently served as a member of the California Commission on Transportation Investment and as the first Chair of the Advisory Panel for the Travel Model Improvement Program of the U.S. Department of Transportation.

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Melvin Webber is a Professor Emeritus who has been a member of UC-Berkeley's faculty in City and Regional Planning since the 1950s and served as Director of its Institute of Urban and Regional Planning during the 1970s and 1980s. He was the first director of the University's Transportation Center (UCTC) and is now retained there as editor of *Access Magazine*.

APPENDIX C:

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