Edward Weiner
U. S. Department of Transportation

The problems in public transportation and the perceived solutions are somewhat a function of one's point of view. Further, the difficulty in solving these problems is increased when the perception of problems and solutions differs among the parties involved because it becomes more difficult to agree on a course of action.

Those involved in different aspects of public transportation must be brought together for the purpose of explicating these points of view and identifying where they agree and disagree. Disagreement, on either the problems or the solutions, should be resolved through an open communication process in which all concerned parties participate. Courses of action can then be plotted and implemented.

Speakers at the conference expressed 5 points of view on public transportation problems and solutions: the urban area, the taxicab industry, the transit industry, labor unions, and regulatory bodies.

Their papers, which follow, addressed the following specific questions:

What are the more severe problems in your area of public transportation at the present time?

What are the more severe problems in your area of public transportation that will exist in the next 10 to 20 years?

Can these problems be resolved through technological, political, or social expertise?

What should be done to alleviate these problems?

Who should take the initiative in resolving these problems?

William J. Ronan
New York Metropolitan Transportation Authority

At a time when society is trying to come to grips with the problems of urban America and the elusive question of providing mobility for people and goods, we witnessed not long ago 2 products of our society, John Young and Charles M. Duke, tooling along the rills and plateaus of the lunar landscape in their Moon Rover a quarter of a million miles away. While hundreds of millions of people throughout the world watched the spectacle live on TV, the astronauts engaged in the most awe-inspiring "dig" in man's history. Despite the barren and alien conditions of space, the exploration of the moon's secrets proceeded with nonchalance.

The drama is almost gone as routine nudges adventure aside. Conquering the moon technologically appears too easy. The conditions confronting us there are alien—but they are not hostile and, increasingly, they are predictable. Imagine the resurgence of public interest in moon exploration if, as we watched the astronauts at work, some moon urchins stole into the picture, stripped the Rover of its hubcaps and vital parts, and with magic markers and spray cans composed pointless but indelible lunar graffiti.

PUBLIC TRANSPORTATION PROBLEMS IN URBAN AREAS

I guess these wild speculations ought to bring us back to earth—and to the point I am making. By contrast, the technological challenge of public transportation on earth is ever so much more complex than moon junkets because out there we must only adapt man and machine to a given set of natural phenomena and down here we must attempt to persuade man and adapt machine to an unpredictable and irrational set of variables that are in a constant state of flux.

The aerospace industry has already had a traumatic introduction to transit facts of life. In the New York region and elsewhere throughout the country we have tossed the aerospace technicians some of our earthbound problems, and they have learned quickly that the cruel environment in which our transport operations must function is a ruthless destroyer of quick-and-easy solutions and an impossible confounder of super-sophisticated, complex approaches as well.

The dynamics of technological planning and development for moving people is an area of knowledge far less charted or understood than the physiognomy of the moon. Historically, public transportation facilities advanced technically only far enough to permit us to make-do with the immediate problems at hand. In the railroad industry, the immediate problem always seemed to be movement of goods as a priority concern over the movement of passengers. As a result, the design of rail passenger equipment for the ordinary traveler had often been an accommodation to the operator—not the consumer.

The American rail industry has had a fundamental technical shortcoming that has had a deleterious effect on public transit. It never engaged in basic research. The industry had, through the years, learned to cope with its technical problems—but it never tried to master them. It was satisfied to deal with the peculiarities of a particular situation without gaining the broad scientific and technological wherewithal to deal easily with growth and change.

The railroad industry's failure—despite all its power and wealth—to comprehend the need for scientific and technological mastery of its functional role in a modern world has hurt the industry, not to mention the modern world, and especially the urban world, which is strangling in its own immobility.

The role I speak of transcends the know-how to make machines move more efficiently. Public tastes and standards today relating to travel, comfort, speed, and reliability have escalated at a rate disproportionate to our current ability to satisfy them technically. Unfortunately, the public now expects a lot more from science than science can currently deliver. In this respect, moon shots have spoiled us.

However, the technological needs of the transit industry are neither so vast nor so complex that they cannot be met within a realistic range of fulfillment. I speak of a range (rather than absolutes) because the public can be an insatiable and sometimes contrary creature in terms of public service demands. Try, as an example, to develop a temperature control system that will satisfy all the passengers in a rail car.

Recognizing the frailties of seeking perfection in our transportation pursuits, let us consider what can be done and is being done in this crucial industry.

To begin with, the new transit technology must abandon the somewhat provincial and expedient approaches to its problems and accept a broadened and more comprehensive role in the planning and development of transport systems. The concept of total transportation planning, which, I am pleased to note, was adopted here in this region with the establishment of the MTA by the state of New York, is essential if we are to design systems and facilities that can do more than cope with a few immediate and highly localized problems. Systems design—the packaging of mobility so to speak—must take cognizance of the liberated and mobile urban dweller who must be offered combinations of workable travel modes if he is to survive.

This means making the realistic assessments of what modes will operate most effectively and be acceptable in a given setting and set of circumstances. This means building subways where they make sense and establishing other modes of travel where they do not. This means recognizing where intercity air travel has the decided advantage over intercity rail—and vice versa—and thus avoiding the costly duplication of public effort in self-defeating and wasteful enterprises. This means developing the

the necessary linkages and connection points to tie together air, rail, subway, bus, and private automobile travel into logical systems rather than competitive modes. This means departure from our long-established national practice of encouraging—if not demanding by law—competition between modes.

Within this broadened systemic context, the criteria for design can be classified as they relate to transportation's 3 major clients: the consumer, the operator, and the community.

The consumer has been the forgotten client in transportation. That role has changed drastically in the past 5 years as new emphasis has been placed on "humanizing" transport systems. But the dead hand of neglect, impoverishment, and deterioration that has stultified the transit industry for decades still has its negative effects on our older existing operations. Putting into ancient systems the creature comforts that are expected of modern operations not only is expensive but often is technically overwhelming.

A case in point is ventilation, which is the subject of a major study carried out with federal assistance by the Institute for Rapid Transit. The $2.8 million study will attempt to establish standards and guidelines for new and existing systems. This type of investigation, long overdue, will help us shape the design of new systems and introduce technological changes to improve our existing ones. Clearly, however, the task is not a simple one.

Similarly, we undertook a study in New York on the problems of noise and vibration as they affect new and existing subway lines. The cacophony of New York's subways is legend—and it was tolerated as part of the New York scene for about 70 years. With the new sensitivities regarding noise pollution, the subways have to be looked at in terms of modern standards of acceptance. Here, too, the task is formidable because of the difficulty of applying traditional approaches to acoustical shielding to the subway environment.

Undoing the past is understandably difficult. Yet it is very much part of the urban transportation technology that had been put to the test to create the quiet, air-conditioned, and aesthetically pleasing new rolling stock on MTA's subways and commuter lines. The result—in the sleek Metropolitans on the LIRR and Penn Central and the R44s, the new car on the subways—is encouraging, but it was not reached without much blood, sweat, and buckets of tears.

A significant part of the problem of dragging our transit industry into the second half of the twentieth century has been the difficulty implicit in designing for the passenger-oriented operator who must provide reliable, moderately priced service on an intensive basis. Reliability of equipment is the backbone of any good service. Yet it is in this crucial area that we have found the greatest pitfalls. This dilemma is by no means isolated in public transportation. From pop-up toasters to 8-cylinder hardtops, the lapses in production and design quality have become commonplace.

But in public transportation, design lapses and production shortcomings inconvenience not one consumer but millions. The need for design to facilitate maintenance and repair is of paramount importance. This factor has been heightened in recent years by the changes in the labor pool—changes that find us with less experienced maintenance and shop workers who must be trained to deal with highly sophisticated Rube Goldberg devices that are difficult to get to and sensitive to adjust.

Designing to maximize the versatility of our systems is another significant need. Here, the federal government has played a role in seeking standardization of facilities as much as possible. In our MTA systems we inherited 83 different varieties of rolling stock. And we are working toward reducing that number and thus reducing costs of inventories, shop time, tools, and so forth.

Another key to versatility lies in our ability to move the same piece of equipment throughout the system without regard to the propulsion requirements in different sections. In this region, as you may know, only electrically propelled rail cars are permitted through the tunnels to Manhattan. This means that trains operating in nonelectrified areas must discharge passengers short of the river crossings or terminate their runs at points outside of Manhattan.

To overcome this, MTA has been experimenting with a gas turbine-electric propulsion

system that will offer great versatility in this region. A federal grant of $7.4 million will help us to purchase two 4-car trains—one from Garrett Corporation and the other from General Electric as prototypes to be tested in passenger service.

Once in use, these high-speed cars will help this region immeasurably in shortening the length of longer commuter runs and in bringing outlying facilities such as Stewart Airport into easy commuting range of the center city.

Still another design consideration to improve operations centers about power savings. In New York, MTA uses about 11 percent of Con Edison's total output. With the purchase of more sophisticated electric equipment and with air-conditioning and other power demand features, we must find ways to make the most of our power usage.

In another federally aided project—also involving Garrett Corporation—we are going to test an experimental power-storage flywheel on 2 conventional subway cars. If successful, this device could dissipate heat caused by braking (achieving an environmental goal) and employ this stored energy to generate electricity to help get the trains moving again.

The conservation of power is not merely an operator's concern but a serious community concern as well. Here again, design for public transportation must consider its largest and most vital client—the community at large.

The urban transportation industry has moved full circle from the public-be-damned slogan (which was coined, of course, by a railroad mogul and implemented with vigor in the heyday of the railroad barons). The transport industry, once the villainous threat to our cities, has now become their hope for survival. And in this new context, we must recognize the needs of the overall community, which in turn must commit itself to help support our systems.

Accordingly, the economics of design play an important role. The utility of equipment in terms of operational cost, maintenance, power demand, useful life, and all of the other concomitant cost inputs has real significance to the taxpayer who must ultimately help pay for it.

Aside from economics is the matter of environmental impact. Sound system design calls for minimizing pollution and other negative impacts such as excessive noise and heat generation.

In still another area of transport, we are waiting patiently for bus design to catch up with modern urban requirements. We are still living with a box on wheels, which is nothing more than the stagecoach or the horse-drawn trolley—only self-propelled. In both body design and propulsion methods, the urban bus is still awaiting a technological breakthrough. Rail rapid transit is not the substitute for bus service—both have distance functions and are not interchangeable. And yet, at this stage, our technological progress seems to be moving ahead more rapidly on the rails.

The tracked linear induction propulsion systems, combined with air-cushion or magnetic suspension devices, are well on their experimental way in France, in Germany, and more recently in this country. By comparison, electric or battery-operated buses are lagging behind experimentally, still awaiting longer lived, lightweight battery components. And, in coach design, easy curb level access for bus passengers is still a gleam in the eye.

The research and development field obviously is wide open to all comers who can apply old technology (as in the case of linear induction engines) to new uses or who can innovate and pioneer new ideas for the new urban society that we are helping to build.

Of course, there is another side to the technology coin: the need to find the funds to bring about major improvements and expansion of public transport systems—not to mention merely maintaining such services.

The transit facilities in this country are among the urban fixtures that, for the most part, were created years ago and have long since been taken for granted along with utilities, communication lines, water supply systems, and sewers. In each case, we literally or symbolically buried these facilities underground and promptly moved on as a society to supposedly more sophisticated urban problems that soon consumed most of our municipal and state budgets.

Not until the beginning of this past decade did we begin to find that the maintenance

of our so-called infrasystems and the fundamental housekeeping responsibilities within our cities were vastly neglected. We also began to realize that the deterioration of these basic services and facilities went to the heart of problems such as poverty, housing, safety, middle-class exodus, flight of business, and other issues that are identified as part of the modern urban dilemma.

Now that society has defined urban transportation as one of the key elements in working our way out of our current difficulties, we find that it has been rendered too feeble to come to the immediate rescue of strangling cities. The past partnership of private neglect and public apathy has taken a devastating toll.

Until we can provide a major infusion of dollars, equipment, and skills to aid public transport operations, we can at best merely hold these beleaguered outposts against the relentless ravages of deterioration and financial erosion. It is clear that there is an urgency to the needs of these systems; and it is also clear that we cannot find the funds to do the job in the passenger fare box alone. The stakes go much beyond the provision of a service to a rider. The whole community, region, and nation benefit from these facilities and, rightfully, should share in some of the costs.

At this point, I believe we have reached that milestone locally and nationally where the public is willing to declare war on urban transportation inadequacies and provide the necessary resources to wage that war and win it. It has become apparent that new urban society is prepared to make a commitment to improved public transport, and that commitment is being translated into positive actions in city halls, state houses, and in the halls of Congress. The shift toward transportation sanity—toward a more balanced set of policies and a more equitable distribution of the transportation dollar—has been very much in evidence in recent months in Washington.

What has happened in our Capital would have been deemed impossible by the experts only a few years ago. Who would believe 5 years ago that Congress would enact in 1970 a $10-billion capital improvement program for new bus, subway, and commuter rail projects? More surprising, who would have guessed that in 1971 the Senate would vote by an overwhelming margin the funds to provide $400 million in operating assistance to bus and urban rail lines that are hard-pressed to maintain services without continually resorting to self-defeating fare increases? Still other surprises have surfaced. Who would have guessed that the transportation secretary would recommend to use funds from the once sacrosanct Highway Trust Fund to assist public transportation operations?

Although I have referred to these events as surprises, please be assured that they did not just happen. The coalition of urban leadership and transit operators—which grew out of this new transportation commitment—has been a prime force in finally bringing to the surface the problems that had suffered in agonizing silence for too many years. As a member of this coalition team (in fact, an issue of the National Journal identifies me as one of the ringleaders), I can assure you that the growing nationwide movement by municipal and state leadership to opt for transit improvements was a deciding factor in influencing legislators who until recently considered this to be an isolated "big-city" problem.

It is apparent that the concentration of federal funds—as demonstrated by the billions spent on the moon shot—could move millions on earth as easily as those 2 passengers on the moon. I do not want to minimize the technology achievements of space exploration when I discuss the seemingly mundane problems of public transportation. Our space program stands as an outstanding example of what can be achieved by underwriting man's genius with vast monetary outlays and buttressing it with strong public and political support.

I recall the lyrics to an old romantic ballad that began, "The moon belongs to everyone. The best things in life are free." Today, in a less innocent world, we have discovered that the moon is far from free and that only a massive administrative, scientific, and financial effort could bring it within man's grasp.

So it is with the achievement of good public transportation in our programmatic world: Only through a combination of improved technology, adequate administrative mechanisms, large financial outlay, and strong public commitment can we begin to address the problem of urban mobility. These are the ingredients of success in our

venture. Without these realities, all we can expect is more of the same: empty rhetoric and pointless technical polemics, leading to what Thomas Huxley called "the great tragedy of science—the slaying of a beautiful hypothesis by an ugly fact."

George A. Avery
Wald, Harkrader and Ross

Until my escape to the private practice of law a few years ago, I had been involved in problems of regulating urban transportation for 5 years as chairman of the Washington Metropolitan Area Transit Commission. I will give a brief history of the course of events during that time and in the year following with regard to transit fares for D. C. Transit System, Inc. (now the Washington Metropolitan Area Transit Authority), the principal carrier in the District of Columbia. This will be useful as a factual background for the somewhat philosophical analysis that I have evolved out of my experience and is the focus of this paper.

When I joined the transit commission in November 1966, a D. C. Transit rate case was in progress. The basic cash fare was then 25 cents; tokens were sold at the rate of 4 for 85 cents or 22¼ cents each. Fifty-seven percent of fares were paid with tokens. In fiscal 1966, the system carried 137,771,403 riders. We granted the company a fare increase in the case that was pending when I joined the commission. By the time I left the commission in 1971, the company had applied for fare increases 4 more times. Each time, a clear showing was made that costs were outstripping revenues and it was necessary to grant an additional increase. Hence, when I left the commission, after 5 years and 5 rate cases, the basic fare had reached 40 cents and there was no longer a token discount. By 1971, the number of riders carried by D. C. Transit had declined to 101,965,573, a drop of more than 26 percent.

Nor has the pressure for higher fares abated. In the year after my return to private practice, D. C. Transit again applied for a fare increase to 50 cents. In May 1972, the commission, while finding that costs would again exceed revenues, refused to grant an increase until D. C. Transit reformed its capital structure. By the time of that decision, the ratio of D. C. Transit's debt capital to equity was a staggering 18 to 1, and the commission felt that about $6 million of equity funds should be invested. The commission made it clear that, if this were done, a fare increase of some magnitude would be granted. At this juncture, the entire matter was appealed in the courts.

Although D. C. Transit, the principal carrier in the Washington area, is the focus of this account, its situation is by no means unique. The other 3 major carriers serving the D. C. suburbs at that time were also caught in the same vicious cycle. Indeed, this same picture can be seen throughout the urban transit industry nationally.

Between 1965 and 1971, the average fare nationally increased more than 43 percent, from 21 to 30 cents. In this period, base fares increased 100 and 80 percent in New York and Chicago, and these 2 cities account for a substantial portion of total revenue passengers in the entire nation. Numerous other major cities have seen increases of 50 percent and more. In Cincinnati, the fare was 25 cents in 1965 and 50 cents in 1972. Meanwhile, to complete the cycle, ridership has fallen sharply; 17 percent fewer total passengers were carried in 1971 than in 1965 and 19 percent fewer revenue passengers.

Coping with the problems of constantly increasing fares and declining ridership in any effective way as a regulator proved to be enormously frustrating. This was basically because the tools for dealing with the root causes of the problem were simply not available to a regulatory agency. Such agencies were not set up to deal with sick companies in a generally declining market. Rather, they have their historical roots in the public utility field, where powerful monopolies provided essential services to the public and the need was to protect customers against the extraction of excessive profits.