



**Intelligent and Environmentally-Sensible  
Transportation System:  
An Alternative Vision**

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The University of California  
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# INTELLIGENT AND ENVIRONMENTALLY-SENSIBLE TRANSPORTATION SYSTEM: AN ALTERNATIVE VISION

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## INTRODUCTION

A recent US DOT plan guiding IVHS research correctly notes that, "Over the next 20 years, a national IVHS program could have a greater societal impact than even the Interstate Highway System " But what will those impacts be? What could they be?

The primary thrust of current IVHS initiatives is to accommodate more vehicles more safely using existing roadspace. The principal focus is on two sets of technologies: 1) real-time information to manage traffic flows better; and 2) automated controls to pack vehicles closer together. A variety of other applications are also being pursued, including transit and goods movement, but are receiving much less attention and government resources. The benefits of current IVHS initiatives are coming under increasing scrutiny. It appears unlikely that deployment of IVHS technologies, other than automated vehicle controls, will lead to major congestion reductions or road capacity expansions (e.g., Hall, 1993; Al-Deek et al, 1989). Highway automation could provide large capacity improvements, but perhaps at a huge economic, environmental, and social cost (Burwell, 1993, Gordon, 1992, Johnston and Ceerla, 1994).

The current thrust of IVHS activities, as indicated above, has its historical origins in the highway engineering community, it is described in detail in the 1993 Draft National Program Plan for IVHS prepared by IVHS AMERICA. One might extrapolate these unfolding IVHS initiatives into the future and treat them as one potential IVHS scenario. It is a scenario that could be described as a pragmatic attempt to guide the development and deployment of information and control technologies or, less charitably, as a reductionist engineering approach to the problem of congestion and safety.

An alternative IVHS vision is proposed here. The overarching goal inspiring this vision is increased accessibility -- not mobility, that is, improved access to goods and services, but with little or no increase in vehicle travel. Three complementary goals, suppressed or ignored in current IVHS activities, are also fundamental to this alternative vision: greater consideration of the less privileged, enhanced environmental quality, and community liability.

Pursuit of these goals would lead to a very different transportation future than in the first scenario. Many of the same IVHS products would be commercialized and promoted in both scenarios, with the difference being that in this second scenario government more actively supports products and activities that benefit lower income classes and the environment. Government marshals its R&D resources, infrastructure investments, and rulemaking authority in such a way that goals of accessibility, equity, and environmental quality dominate the design of the overall system architecture. The many effects of IVHS technologies on travel behavior, land use patterns, vehicle acquisition decisions of households and businesses, and corporate logistical and facility location decisions are treated as primary impacts. The power of IVHS technologies to transform the urban and social landscape, similar to that of the Interstate Highway System, is acknowledged and harnessed.

## TOWARD A WIDER RANGE OF TECHNOLOGIES

This alternative vision implies a very different future. One major difference is that a wider range of technologies are envisioned, as suggested below. They include technologies that have been mostly ignored by IVHS proponents, such as smart teleshopping, neighborhood electric vehicles, electronic speed controls, and emissions monitoring devices, as well as others, such as smart paratransit, that are under the current IVHS umbrella, but not receiving high priority.

Shopping through interactive television and other smart information systems might halt the trend toward longer shopping trips to regional warehouse stores. (Facilitating the use of more and better information for goods movement and inventory management by smaller businesses would also offset the trend toward large warehouse stores and long shopping trips.)

Neighborhood electric vehicles, combined with other initiatives discussed below, can be an attractive option for maintaining (or even increasing) accessibility and mobility. Older and less physically-capable people would especially benefit, thanks to the greater ease of driving and the ease of incorporating semi-automated driver-assists into low-speed vehicles. These driver aids would include enhanced collision avoidance, smart cruise control, and assisted steering. Recent market research on vehicle purchase desires in California suggests that a sizable number of households would purchase a small neighborhood car (Kurani et al, 1994, Sperling, 1994).

Electronic speed controls can be used on a variety of roads to provide a variety of benefits. They can be used on residential and low volume roads to increase overall safety and enhance the attractiveness of non-motorized travel and small neighborhood vehicles, on arterials to smooth flows and thereby reduce emissions from gasoline-powered vehicles (and in a manner that enhances neighborhood car safety), and on freeways to reduce speed differentials to improve safety and reduce emissions. Provisions could be made for manual overrides in emergencies and for emergency vehicles such as ambulances, fire engines, and police cars.

Smart paratransit, whereby real-time information is used to connect commercial providers and subscribed rideshare vehicles with travelers, may be the single best opportunity for substantial reductions in vehicle use. Accordingly, it would be given very high priority in this scenario.

## TECHNOLOGY AS A CATALYST FOR CHANGE

A second major feature of this alternative vision is the identification and promotion of technologies that could be catalysts for more far reaching and positive changes. The neighborhood electric vehicle is one example. By presenting a viable alternative to the full-size car, these small and low-speed vehicles could be the catalyst for renewed local emphasis on strengthened neighborhood centers and non-motorized travel. Their development and initial deployment might set in motion a series of events that transform communities and road infrastructure.

Another example is the use of IVHS as the enabling technology for more equitable and efficient highway user charges. Better pricing is necessary for the long-term efficient management of our surface transportation system and attainment of healthy air quality in major cities.

## LINKING TECHNOLOGY AND DEMAND MANAGEMENT

A third feature of this environmental scenario is a tight linkage of technology deployment with demand-side initiatives in a deliberate attempt to create synergies. The benefits for both technology initiatives and demand-side initiatives will be much greater when paired together than when pursued in isolation. For instance, efforts to price roadspace are unsuccessful because of strong political opposition and inelastic responses by motorists -- for the fundamental reason that drivers see few alternatives to driving. The new fees are seen as punishment, not as incentives to change. If road pricing were introduced as a package with new service and vehicle options, such as smart paratransit and electric vehicles, and used to subsidize those services and products, as well as offset existing taxes, then drivers would more willingly accept road pricing and more quickly embrace the new services and products. Similarly, pairing technology mandates (such as a requirement for zero emission vehicles) with fees on

dirtier cars and rebates for cleaner-burning cars would be far more effective than adopting ZEV mandates or "feebates" in isolation

## SOCIAL EQUITY

This emphasis on social equity is also an important feature of this scenario. Rather than exacerbating the chasm between social and economic classes, it aims to close them by providing high levels of accessibility, not only to the well-to-do, but also poorer people. Instead of IVHS benefits accruing to affluent drivers in the form of expensive safety, navigation, and control devices, the emphasis would be on improved accessibility for all.

## SOCIAL COST PRICING

Attention to distributional effects does not, however, imply naivete about the capitalist nature of the economy. The highest priority needs to be given to full social cost pricing. This is a fifth feature of this scenario. The purchase and use of vehicles must be priced to account for the large unpaid social costs associated with motor vehicle use. Doing so, we note, does not necessarily place a larger burden on the poor (Cameron, 1994). In any case, the unpaid costs do not accrue evenly across vehicles, fuels and drivers. The unpaid costs may be near zero in some situations, such as uncongested, unpolluted areas, and huge in others, such as peak times in polluted downtowns. IVHS technologies can and should be used to create clever pricing strategies to target those trips and vehicles that are most costly -- clever in the sense of being politically acceptable and not overly compromising equity goals. Examples include fees on polluting cars with rebates for zero emission and neighborhood electric vehicles, road pricing on congested roadways, pricing revenues used to cross-subsidize various smart paratransit operations, and pay-offs to local residents that have their streets priced or restricted in other ways.

## CONCLUSION

Most of the current IVHS services and products will probably lead to large new markets for a wide variety of companies in communications, automotive manufacture, electronics and other high-technology industries. We ask two questions, though: 1) Will those IVHS technologies provide large enough social benefits to justify large government subsidies and support? 2) Is government being assertive enough in guiding technology development and deployment toward the public interest? We think no, in both cases. We suggest a new vision of IVHS policy and investments that embraces social goals of environmental quality, transportation access for all, and urban livability. If public funds and public agencies are to continue playing a prominent role, as they should given the large public presence in the transportation system, then a stronger social vision needs to be articulated and pursued. Expanding highway capacity and creating a market for private business is insufficient justification. A more appropriate and desirable IVHS vision is one premised on increased accessibility to goods and services without increased vehicle travel, greater consideration of the less privileged, enhanced environmental quality, and more livable communities.

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MR. MUNNICH: Thank you, Dan

Our next speaker is Michael Replogle. Michael has been codirector of the Environmental Defense Fund's Transportation Project since 1992. He is responsible for EDF efforts to promote effective regional enforcement of the Clean Air Act and ISTEA transportation reforms in major metropolitan areas. From 1982 to 1992, Michael was transportation coordinator for the Montgomery County, Maryland Planning Department. He served as a part-time consultant to the Federal Highway Administration and World Bank on non-motorized transportation planning methods and sustainable transportation strategies for development.

He holds an MSE and BSE cum laude in civil and urban engineering and a BA cum laude in sociology, all from the University of Pennsylvania.