SUMMARY OF THE PANEL WORKSHOPS

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During the conference the conferees were divided into 4 panel workshops to discuss specific issues related to (a) land use impacts; (b) impacts on travel volumes and traffic flow characteristics by all modes; (c) impacts on social and environmental characteristics; and (d) impacts on economics of the region and transportation systems. The panels attempted to define the significant issues and to determine research needs in order to assess the impact of the BART system on the San Francisco metropolitan region. On the final day of the conference a plenary session was held to review the activities of the individual panel workshops and to provide an opportunity for a general discussion.

PANEL 1: LAND USE IMPACTS

Britton Harris, chairman

The principal recommendation of Panel 1 has largely to do with data systems. The evaluation of land use changes influenced by BART depends substantially on the availability of information; this would require the creation of a data bank. The data system should be a regionwide system and serve many planning purposes besides the analysis of the BART impact. This data system should be coordinated with other types of efforts, and a 1975 census of the region should be encouraged. The data system should be concerned primarily with the Bay Area, and the panel does not recommend the establishment of an independent control area outside of the Bay Area in which parallel data would be collected. The qualitative and quantitative information of local development probably has to be investigated in detail and not on an aggregate basis. When control areas in non-BART regions are required, they should be established along the lines presented in the paper by Boyce.

The types of information to be gathered in the data bank must be based on considerations of potential users. One of the users might be the BARTD itself, especially for questions concerning system planning and extensions. Other users would be local planning agencies who are concerned with zoning and who have to adapt to the BART system. Other metropolitan regions throughout the country will be looking at the BART system to determine its economic feasibility and its ability to service the needs of the region. Likewise, national and state governments who have to allocate funds for transit will be concerned with the social, economic, and environmental effects of the BART system and its ability to help solve the passenger-transportation demands on an economically sound basis. Studies must be related to decisions that are both short term and long term.

Some of the specific research questions to be addressed relate to (a) land use impacts on central business districts such as San Francisco and Oakland and other local impacts and (b) development in corridors that are served by the BART system and those that are not and within counties and between counties. The welfare aspects of distribution and location of various segments of the population should be considered, including distribution, location, and accessibility by different segments of the population. These studies ought to be in a regional context and should include those parts of the region not served by the BART system.

Regarding land use models, the panel was inclined to pass a "self denying ordinance." There is a professional bias in favor of modeling, but the panel thought there was no clear way that models can aid in defining the impact of the BART system except for formulating some theoretical or conceptual understanding.

Schneider's work on the degree to which a region has been structured and Boyce's work on "regional temperatures" provide some theoretical ideas on which to base impact studies. However, there is still difficulty in interpreting social values of various

measures of change. For example, is the higher structuring of land use toward that of New York City, as compared to Los Angeles, a good or a bad thing?

In creating a data bank one should consider that the BART impact studies should last over a period of 10 to 20 years. Present emphasis should be on the data to be collected, and some of the questions of measurement and interpretation can be deferred until the impact of the BART system can be measured in 5 to 10 years. The priority now is to capture the data from which later impacts of the BART system may be assessed.

PANEL 2: IMPACTS ON TRAVEL VOLUMES AND TRAFFIC FLOW CHARACTERISTICS BY ALL MODES

Norman Kennedy, chairman

Following the recommendation in Zettel's paper, the panel directed its attention to considerations of traffic volumes and traffic flows as the initial starting point for the impact research. The panel thought that, because the primary purpose of the BART system is to relieve the traffic congestion problem, the impacts of the BART system must be measured primarily in terms of traffic volumes and traffic flow changes. If there are no significant changes in traffic volume and traffic flow, the BART system will not have a major impact on other transportation modes, land use, or on the economic, social, or environmental characteristics of the region.

The panel divided its considerations into 4 major topic headings: (a) major parts of proposed research, (b) significant items of research, (c) roles in research and action programs, and (d) possible beneficiaries of impact studies.

The panel defined 4 major parts for research: (a) research on methodologies—for example, how to improve home interview techniques, accident data for transit, and coordination of data collection with other agencies; (b) data collection activity and data base structuring; (c) interpretation of data; and (d) evaluation. The panel thought that some of the present survey techniques, though satisfactory, were extremely costly, and better ways were needed to obtain data. For example, the current home interview technique is costly and has a number of deficiencies. Research on how to collect similar data would be worthwhile. One suggestion for collecting data on the journey to work is to use an interview technique at the work site instead of at home.

The panel identified 3 items as being significant for research: (a) transportation consumers; (b) the transportation system; and (c) individual corridors. The research related to transport consumers should consider effects of automobile ownership, trip-making by mode, and trip lengths by mode. The data would most likely be obtained through interviews. Research relating to the transportation system should consider effects of persons making trips and vehicles making trips, system speeds, system accessibility, terminals, system safety, system reliability, system costs including travel costs, and comfort and convenience. Such data probably could be collected through traffic counts, studies, and interviews. Research related to the individual corridors—bridges, gateways, and selected freeways—is in progress and has been for quite some time by a number of agencies. A great deal of data is available from these various sources. Data on traffic flow and traffic volume were collected in the recently completed BATS study. The 1970 Census will reveal information on the journey to work, and presumably data systems initiated by BATS will be continued.

The third major heading—roles in research—was selected as an attempt to define the techniques in getting research in this area started and coordinated. One suggestion was to have a joint committee to coordinate the research and collect the data, perhaps under the auspices of the Regional Transportation Planning Committee. Another suggestion was to divide the responsibilities and have the Regional Transportation Planning Committee undertake research related to the transportation consumer and individual corridors and have universities or other research agencies undertake research relating to the transportation systems.

The panel considered the possible beneficiaries of such impact studies. Among possible beneficiaries are local communities and BARTD for consideration of system extensions; other cities in planning comparable systems; federal, state, and local agencies for funding and transportation policy making; and transportation analysts in evaluating models and prediction techniques and evaluating their accuracy.

PANEL 3: IMPACTS ON SOCIAL AND ENVIRONMENTAL CHARACTERISTICS

Donald Foley, chairman

One of the first questions discussed by panel 3 was whether research on BART should be designed mainly to aid in improving BART (including possible future extensions) or to aid designers of other metropolitan transit systems. It was decided that although the San Francisco Bay Area had peculiar characteristics, such as topography, research findings should be transferable as much as possible. The unique features of the Bay Area deserve some research and must be considered in the transfer of information to other regions. The panel considered the problem of identifying the social and environmental goals that a transit system such as BART might be expected to satisfy. It was pointed out that goals differed according to different interests in the Bay Area and that behind the BART system was a complex network of complementary and conflicting social, economic, and ecological goals and values that resulted in the construction of BART. Contributing further to the difficulty of research in this area is the continual changing of priorities attached to various goals over time. For example, at its inception the BART system was directed primarily at relieving the traffic congestion problem in the Bay Area. Because of the social and environmental considerations, which are now receiving increased public attention, these factors may be expected to play a considerably greater role in future evaluation of the impact of BART than they did when the decision was made to construct the system.

The panel spent considerable time considering whether, in designing impact studies, transit and automobile usage should be considered as competitive or as potentially complementary modes. Although diversion from automobile to transit might have been a primary consideration in creating the BART system, BART may offer a potential transit facility for persons who do not have ready access to automobiles. Also, transit may be able to penetrate high-density areas that are already in existence by means of tunneling, which does not require large amounts of land or displace substantial numbers of people. Therefore, the panel felt that both the competitive and complementary aspects between automobile usage and public transit should be considered in designing impact studies of the BART system. There was general agreement that the most urgent need was for feed-back information that could be used to improve the operation of the BART system.

TABLE 1

SUGGESTED RESEARCH ON THE SOCIAL AND ENVIRONMENTAL IMPACTS OF BART

Research Topic	Votes by Panel Members	Research Topic	Votes by Panel Members
Changing employment opportunities	9	Study of information system employed by BART to inform users and potential users	3
Low income	6	Study of the feeder systems and their ties to BART	2
Reverse commuting	4	Reliability and waiting time in use of BART and feeder systems	1
Latent demand for transit service	7	Impact on economic activity and commodity flow	2
Low income (also listed above)	6	Study of the attitudes and expectations of the original BART designers	2
Environmental impacts of the transit route	7	Study of BART goals and their fulfillment	1
Changes in character of neighborhoods affected by BART	4	Study of impact on highways in relief of congestion	2
Effectiveness of joint land uses of space adjacent to or under BART tracks and stations	2	Impact on car pool practices	1
Aesthetic impact	2	Leisure trips and miscellaneous trips by BART	1
Relocation impacts, renewal undertaken	1	Recreational opportunities	1
Measures of accessibility	4	Unpredictable impacts of BART	1
Analysis over time of election results on topics dealing with transit decisions	4	Study of BART stations	0
Studies over time of public attitudes toward transit	3	Special service features	0
Impact on political structure (or on power structure)	3	External connections with other transportation terminals	0
Institutional impacts	2	Safety features	0
Ecological impacts	4	Impacts on segregation-desegregation patterns	0
Pollution impacts, including air and noise pollution	1	Adaptability of BART over time	0

Because of the breadth of the topic, it was extremely difficult to systematically identify and attach priorities to needed social and environmental impact research. The panel therefore developed a list of possible research topics, and panel members were then asked to vote according to order of importance for the 6 most important topics. The topics and number of votes received are given in Table 1.

One interesting observation on study design is the possible comparison of the 3 portions of BART: one-third is above ground, one-third is at ground level, and one-third is below ground.

PANEL 4: IMPACTS ON ECONOMICS OF THE REGION AND TRANSPORTATION SYSTEMS

Harmer Davis, chairman

The panel thought that current economic impact techniques need to be reassessed. There was considerable discussion on how to evaluate the consequences of BART. There was general agreement that an analysis of BART must include the overall economic costs and benefits of the system, the effects on the other transportation investments, and the indirect effects on the economics of the region. The panel rejected the "shopping list" approach to evaluating the economic consequences. It discussed the potential clients for the research and their overlapping and conflicting nature. A suggestion was made that the economic consequences should be evaluated in terms of resources that are used up.

The use of cost-benefit analysis for determining the economic consequences of the BART system has many shortcomings. Not only economic but social and environmental consequences, which may use cost-benefit or other techniques, must also be considered. Even so, no immediate alternative is in the offing to replace the broad approach that may be categorized under cost-benefit analysis. The fact that costs and benefits are currently undergoing a substantial redefinition does not automatically nullify the value of the approach. The panel affirmed that in any analysis the total region should be used as the unit for analysis.

The question of subsidy was consistently interjected into the discussions. Some subsidies are real, and some are intergovernmental accounting transfers that are used to meet other objectives and are therefore bookkeeping activities and should be ignored in cost-benefit analysis.

Costs were discussed by the panel under the general categories of capital costs, operating costs, and indirect costs. Some of the factors to be considered in defining capital costs are the impacts of inflation and technology, governmental requirements, forced changes on the system, and extensions of the system regardless of their profitability. Operating costs, which include the maintenance and operation of the equipment and facilities, were thought to require new consideration for the comparison that will be needed. The indirect costs include the effects on other transportation systems, short- and long-term effects on the economy itself, and costs attributable to business, environmental, social, and institutional changes or distruption caused by the construction and operation of the system, including changes in traffic flow and police protection requirements.

The basic benefits to be anticipated are the change in time for commuting, i.e., the time costs saved by the system users. One of the primary concerns should be a study of the problems of estimating demand and predicting modal split under different policies and conditions. The relationship between the pricing of the services and a demand should be considered.

The redistribution effects of the BART system should be studied including its effect on the accessibility to jobs, on urban structure, and on the region's tax base. One research strategy might be to compare the alternatives of freeways, other BART systems, other transit systems, or making no decision for transit improvement.

The panel was concerned with the data base needed for such impact studies and felt that an overall strategy for data collection was warranted. As other panels pointed out, some data would be required on a continuing basis, other data could be obtained on a sampling basis. Planning and census agencies that collect data on a recurring basis

should work out a mutual scheme for sharing the information with all parties doing research requiring such information.

The panel voiced general concern that a generally accepted concept for economic evaluation has not developed in transportation as was developed in water resources in the early 1930's. A concerted effort is needed by transportation economists and planners to develop an acceptable technique for evaluating economic consequences of transportation improvements.

DEMAND ANALYSIS AND TRANSPORTATION COST AND PRICING FOR THE BART SYSTEM

Although the demand analysis, cost, and pricing for the BART system was discussed in the formal papers and in the panel discussions, some participants of the conference thought that it neither was given the position of importance that it warranted nor received sufficient consideration of the research needs. It was pointed out that the construction of the BART system was primarily predicated on its ability to divert highway users to urban transit and thereby reduce the need for future expansion of freeways and Bay crossings in the region. In addition, there is concern that the BART system should also serve low-income, minority, aged, and other groups who do not have ready access to automobiles and are dependent on public transportation facilities.

The participants pointed out that the outcome of the BART system not only will be a concern of the Bay Area but also will be examined as a case study by other urban areas contemplating urban transit innovations. Regardless of the social, economic, and environmental effects of the BART system, the key determinant in decisions by other cities to construct similar facilities will be the economic viability of the system and its ability to satisfy transportation demands and reduce urban traffic congestion. Therefore, several conference participants suggested that a section be attached to the panel summaries amplifying the need for an analysis of the demand, costs, and pricing of the BART system.

Some of the topics suggested for demand analysis research are, Who will use the system, when, and for what purposes? Who is not using the system? Why are they not using it? A primary research topic would be the effects that BART has on the demand and use of other transit systems and transportation facilities. Studies in other urban centers indicate that major improvements in rail transit have a marked effect on parallel bus systems. The effects of levels of service, comfort, and convenience on BART usage should be researched. Likewise, travel time comparisons and delays between BART and other modes should be researched to determine their effects on modal split.

Cost and investment analysis for BART should receive special attention. BART offers an excellent opportunity to examine the factors involving investment costs and decisions as to cost allocation. It offers an opportunity to evaluate factors determining interest rates and the ability of the system to recover capital investment as well as meet operational, maintenance, and depreciation costs. The system also offers an opportunity to examine the relationship between levels of service and the costs involved. Likewise, research is needed on comparison of capital and operating costs per passenger on the BART system with those on other transportation options.

The BART system offers some unique financing techniques such as the toll bridge revenues and property taxes to cover debt service. The effectiveness of such financing should be considered as well as its effect on tax and investment opportunities for other transportation systems in the Bay Area.

Intertwined in the demand and cost analysis is the need for research on pricing strategies for urban transit systems. Welfare economists have given considerable discussion to methods for pricing public transportation services and have made recommendations varying from free service to pricing that includes total operating and capital costs. The BART system will have a pricing structure initially based primarily on distance traveled; some readjustments are expected in the pricing strategy over time. The BART system will therefore afford an excellent opportunity to examine the relationship between price and demand and the effect of price strategy on diversion from other modes of transportation. Varying the pricing structure will require decisions regarding whether the objective is to optimize revenue or passenger usage and a consideration of the economic and social consequences of such decisions.