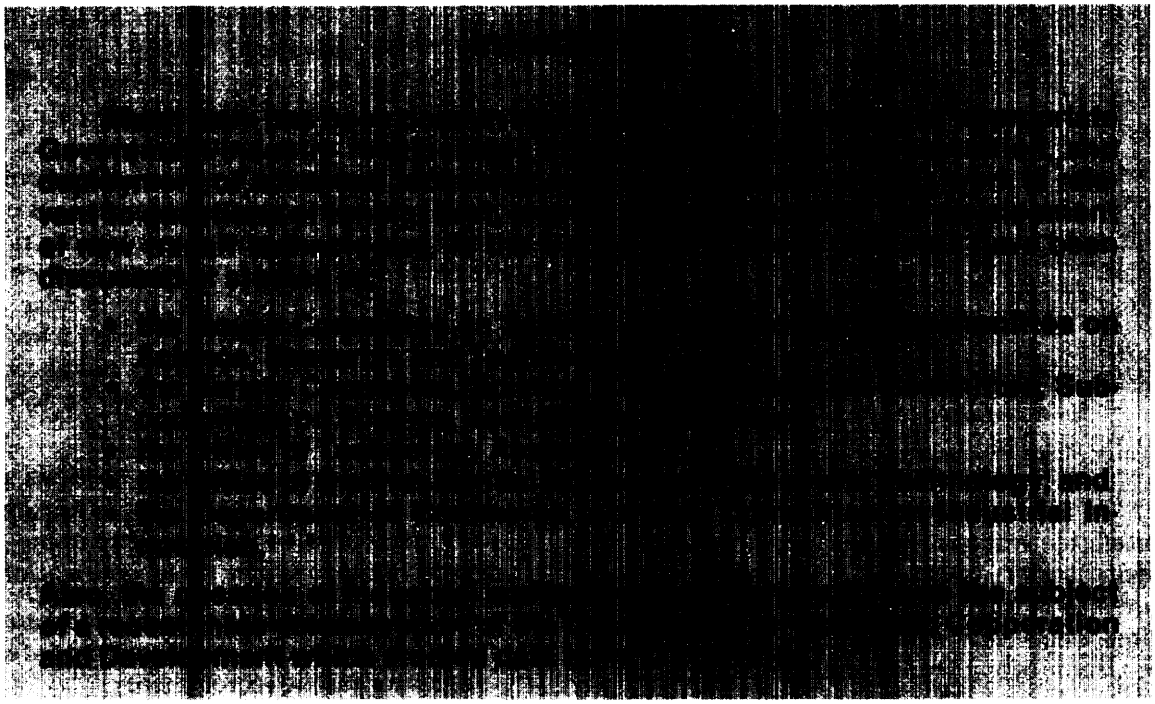
Chapter VI

GOVERNMENT/INDUSTRY RELATIONSHIPS IN ADVANCED GROUP RAPID TRANSIT TECHNOLOGY DEVELOPMENT



Results of these investigations show:

- that there are substantial national differences in R&D policies,
- that Government should become involved in only those specific technologies which support national policy objectives,
- that there are major policy options between promoting R&D or supporting Government procurement of innovative technologies, and
- that technology development and technology demonstration ought not to be confused when moving innovation through the difficult transitions from concept to deployment.

They further indicate a growing concern in the United States and several other mature industrialized societies that industrial productivity is declining or stagnating and that incentives for stimulating innovations which might reverse this trend are either lacking or not working properly. Much of the emphasis in some countries, most notably Japan, has been on innovation that would make those nation's industrial base more competitive in international markets.

[1] U.S. Congress, Office of Technology Assessment, *Government Involvement* 1)1 *the Innovation Process* OTA-R-73 (Washington, 11. C U.S. Government Printing Office, August 1978).

[2] U.S. Congress, Office of Technology Assessment, *The Role* o/ *Demonstrations* 1) 1 *Federal R& D Policy* OTA-R-70 (Washington, [>. (_ : U.S. Government Printing Office, July 1978).

[3] U. S. Department of Commerce, "Domestic Policy Review of Industrial Innovation," Work Plan, Sept. 18, 1978, Washington, D.C.

[4] Advisory Subcommittee on Economic and Trade Policy of the Advisory Committee on Industrial Innovation, "Dratt Report on Economic and Trade Polic y, Dec 20, 1978, Washington, D.C. – An advisory committee convened by and reportin, to the Secretary of Commerce.

[5] Advisory Subcommit tee on Procurement and Direct Support of Research and Development of the Advisory Committee on Industrial Innovation, "Draft Report on Federal Procurement Policy, ' Dec. **22, 1978,** Washington, D.C. —An advisory committee convened by and reporting to the Secretary of Commerce.

"Organization for Economic Cooperation and Development, *Policies for the Stimulation of Industrial Innovation,* Volume 1—Analytical Report; Volume 11- 1—Country Reports Canada-France-West Germany -Italy-Japan-Uni ted States-United Kingdom; Volume 11-2—Country Reports Australla-Austria-Denmark-F]n-land-Ireland-Netherlands-Norway-Spain-Swede n, Paris, 1978. Available in English or French versions.

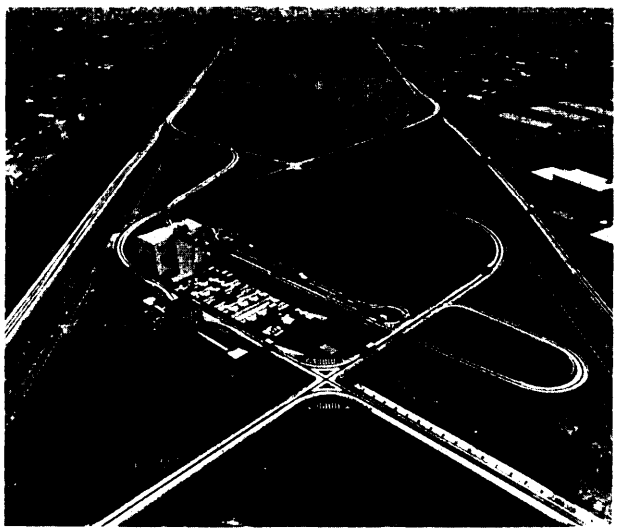


Photo credit Japan M/n/s try of International Trade and Industry

Japan develops advanced transportation technologies to penetrate international markets

Among the reasons that the question of Government/ industry relations is important is the near demise of the U.S. transit vehicle industry* at a time when "Buy America" is a stated policy of the Urban Mass Transportation Administration (UMTA) and other Federal agencies. As of this writing there are no American-owned manufacturers of light- and heavy-rail passenger cars and only two reluctant domestic manufacturers of full-size transit buses. The factors that influenced this decline need to be identified to ensure that advanced group rapid transit (AGRT) does not suffer a similar fate. The disintegration of U.S. industrial capability in the transit industry has coincided with an era of substantially increased Federal involvement in the planning, funding, and management of transit. Shifting Government procurement policies, with unrealistic design standards and leadtime, have accounted in part for the demise of the transit supplier industry. Future policies on development of AGRT and other advanced technologies in urban transit should be looked at with these industry impacts in mind.

Each of the remaining three sections of this chapter considers an important justification for Government involvement in developing public transit technologies. The three justifications are:

- to reduce barriers to innovation caused by unique problems of developing technologies for public sector clients,
- to deal with issues of foreign competition and trade, and
- to support other long-range national policy objectives.

● At least that segment of the industry willing to market vehicles which meet the criteria for Federal assistance.

Barriers to Innovation

The complex institutional and regulatory process surrounding the procurement of urban transit systems inhibits private suppliers from developing the innovative technologies necessary to meet today's transit needs.

The complexity of the public institutional arrangements and decisionmaking processes that influence deployment of new technologies in urban settings is perhaps the biggest barrier to innovation which the private sector faces in developing new technologies. Since established systerns, procedures, and expectations are difficult to change, incremental improvements are often preferred to significant departures from tradition. System suppliers are reluctant to develop unique innovative systems when competition is required for governmental procurement. And problem-solving technologies aimed at a future, rather than a current problem, often find no potential client agency present at all to deal with the long-range future.

For these reasons private sector firms often fail to show interest in developing products for such difficult and uncertain markets. One major response that Government could take would be to guarantee a market for innovative products, rather than to provide R&D grants to get the technology developed. Market guarantees are considered further in chapter VIII.

Another barrier to innovation comes from a reluctance on the part of major corporations to become involved in potentially risky ventures. Unsuccessful attempts to meet rigid performance and reliability requirements serve to discredit the supplier more often than those responsible for creating unrealistic specifications. The high visibility of transit systems contributes to an atmosphere of confrontation between suppliers and their public clients, making resolution of problems more difficult than in private sector commercial transactions.

The lack of markets for publicly supported new technology also limits involvement. Boeing was awarded the Morgan town contract in 1970, but has yet to garner another automated guideway deployment contract. Otis, the other AGRT contractor, still has only its single deployment at Duke University, a nonpublic client. Boeing-Vertol, with UMTA assistance, designed and built the standard light-rail vehicle, a technology which will probably not see service beyond Boston and San Francisco. Three domestic bus manufacturers (General Motors, AM General, and Grumman Flexible) have also claimed that the brief run of recently developed full-size transit buses will not allow them to recoup their investment in design and tooling. All declined to submit bids for the first attempt at a transbus procurement on May 2, 1979.

While local governments supposedly have control over technology selection through the alternatives analysis process, automated guideway systems are rarely given serious consideration. Federal regulations for capital grants restrict system considerations to "operable segments"[7] whereas the strongest market for AGRT appears to be in regional or multicorridor deployments.

If the institutional structure itself is not enough to constrain the enthusiasm of system suppliers, then the lack of enthusiasm on the part of system purchasers may be the telling blow. Transit operators, conservative by nature, and a cautious public are reluctant to take a chance on unproven systems given the adverse publicity generated by recent Federal demonstrations and deployments of new technologies. In several cities visited by the OTA staff for this assessment, the main operator reaction was a desire for additional buses to relieve current overcrowded conditions. Pressed with such immediate problems, they show little interest in solutions that will not be available for another 10 years.

Government involvement is no guarantee of success in developing new technologies. Aside from the controversy surrounding several new U.S. technologies, two important foreign ventures were also unsuccessful. The transurban technology of Kraus-Maffei sponsored by the Province of Ontario was abandoned after severe technical problems developed. Japan's CVS system, although successfully demonstrated on an extensive test track, has not yet been deployed. Moving a complex public technology from laboratory to deployment is a difficult process with the potential for great financial risk and political embarrassment.

[7] U.S. Department of Transportation, Urban Mass Transportation Administration, "Major Urban Mass Transportation Investments: Statement of Policy," *Federal Register*, vol. 41, No. 185, Sept. 22, 1976, p. 41513.

Foreign Competition and Trade

The potential of broad international leadership in the transit technology field is not a credible prospect for U.S. industry. However, the possibility of component or system leadership in automated guideway transit remains if pursued more deliberately than in the past.

While the United States is carrying out its own programs of advancing transit technology through development of downtown people mover (DPM) and AGRT system development, foreign industries are making progress on systerns that may enter the international market perhaps well ahead of U.S. technology. A more immediate concern to those interested in questions of technological leadership and trade balances, however, is the near demise of U.S. pro-

ductive capacity in more traditional transit technology. Both in the areas of light- and heavy-rail car production, U.S. firms have left the field after losing out to foreign suppliers on the limited procurement activities in this country. The potential of broad international leadership in the transit technology field is not a credible prospect for U.S. industry given both the makeup of the existing supply industry and the geographic dispersion of the transit system replacement demand concentrated in European countries. However, the possibilities of component, product, or system leadership may remain in certain niches of the transit spectrum if they are aggressively pursued in a more systematic manner. Whether or not the rewards of such a restricted development strategy are worth the costs is a major question, however, given both the softness of the U.S. market for such advanced technologies and the foreign competition under development.

The status of various forms of group rapid transit and personal rapid transit abroad as of 1975 was well-documented in the previous OTA assessment, *Automated Guideway Transit,*[8] The programs which are proceeding abroad that seem to have relevance to the AGRT program here in the United States are the Cabintaxi and H-Bahn systems in West Germany, two Japanese systems under development in the Kobe and Osaka port districts, and the French Aramis system. The Cabintaxi system which has had test track demonstrations in Hagen, West Germany is now being deployed in an outlying suburban portion of Hamburg. The system, under the sponsorship of the industrial consortium of Messerschmidt-Bolkow-Blohm and DEMAG and the Federal Ministry of Science and Technology, has performance characteristics very close to the specifications UMTA has set for AGRT. The initial development costs are shared 80 percent by the West German Federal Government and 20 percent by industry, although the system originated as an industrial initiative. As it enters the demonstration stage, local government and the Federal transportation ministry will begin cost-sharing with the system developer.

Japanese systems under development are perhaps more modest technologically than the West German system, but they are proceeding with considerable active support by local governments in Kobe and Osaka.

In France, the Aramis system, under development by Engins MATRA, has gone through several test track demonstrations near Paris, but has not emerged to a point of major development. The VAL shuttle-loop system is being installed in Line. Studies involving the RATP, or Paris Metro Authority, have been done for suburban installations linking the regional transportation system, but no final decision on a deployment has been made.

A summary of prospective foreign competition indicates an interesting contrast. Technologically, foreign developers appear to be on a par with accomplishments in the United States. A limited number of systems have been deployed in the benign operating environments of amusement and activity centers, and more advanced technologies have been investigated on test tracks. However, only the West German Cabintaxi system appears technologically advanced over anything tested to date in this country. On the other hand, only the U.S. systems have operating experience akin to what might be encountered in real urban settings. The Morgantown and Airtrans systems are the two most complex and extensive systems in daily operation anywhere in the world today. Foreign competitors, therefore, would appear to trail in that important step of technology and service demonstration. However, if the Hamburg Cabintaxi demonstration succeeds, technological leadership could shift overseas.

[8] U.S. Congress, Office of Technology Assessment, *Automated Guideway Tram/t,* OTA-T-8 (Washington, D. C.: U.S. Government Printing Office, February 1975).

Long-Range Objectives—An Intermediate Recipient

To overcome the absence of interest in long-range solutions by public agencies, an intermediate recipient for technological innovation could be created similar to those developed in West Germany and Japan to stimulate industry over the long term.

AGRT technology and even more advanced performance system concepts might continue to be funded and programed by UMTA or they might find a better institutional home elsewhere in Government. *One* of the critical issues raised in the OTA report on Government involvement in the innovation process[9] is whether or not Congress should provide direct support for non-mission-oriented technology. Mission-oriented technology is that directly relevant to the mission of the agency conducting the research or technological development. It appears that UMTA's involvement with AGRT might be a direct mission-oriented portion of its urban transit role. But the foreign experiences leading to development of advanced forms of transit technology have almost all been examples of non-mission-oriented agencies taking the lead.

In Japan, the Ministry of International Trade and Industry took the lead in encouraging the development of CVS, not for the express purpose of improving urban transit, but instead for the promotion of numerous facets of Japan's steel, electronics, computer, and other industries seeking new product developments and new markets. The Ministries of Transportation and of Construction did not take an active role in this now dormant program. In West Germany, the lead in supporting the development and demonstration of the Cabintaxi system is again in the Federal Ministry of Research and Technology and not the Ministry of Transportation. Similar cases exist in the United Kingdom, France, and Canada where the initial efforts aimed at creating a small-vehicle automated transit system were championed by special non-mission agencies interested in technological innovation for industry's sake and incidentally for transportation mission outputs.

In the United States no such agency exists with the exception of the Federal laboratories and the National Science Foundation. However, as stated in a recent OTA report, the concept may be advantageous:

> This policy [of having only mission-oriented technology] differs markedly from the practices and procedures of other technologically advanced nations, notably Japan, in which the Governments support technological innovation with no other goal than the general economic one of helping particular sectors of industry to grow and to compete in international markets.
>
> Increased attention has recently been focused within the Government on ways in which, in cooperation with the private sector, it might seek to stimulate and encourage technological innovation through programs of direct support of some kind. There are three basic reasons for the heightened interest in such programs. First, the United States is facing increasingly stiff competition in technology-based products from other nations that have programs for the domestic support of technological innovation for purely economic purposes.
>
> In addition, the social returns on technological innovation are often greater than any reasonable expected private return, due to the inappropriability of some of the benefits, which make a Federal sponsorship role appropriate. Lastly, there are purely social reasons for supporting innovation. An example of these is the general desirability of creating employment. [10]

Other such R&D programs exist, albeit with different missions and host mission-oriented agencies. They may face the same troubles of timing, lack of constituencies, and risk-sharing that AGRT does. Perhaps out of the Presidential initiatives on industrial innovation or out of the congressional oversight and review of them, some multiagency approach to improved Government/industry relations could be developed that would benefit the long-range prospects for AGRT and other urban or institutionally complex public technologies.

[9] *Government Involvement in the Innovation Process*, op. cit., p. 52.

[10] Ibid.

Summary

AGRT technology should be viewed in the context of broad national policy with regard to Government/industry relations and to the demonstration of public technologies in real-world settings. Much experience has been accumulated in recent years on both of these subjects, experience that is highly relevant to the questions of timing, cost, and fundamental approach to the development, demonstration, and ultimate deployment of technologically advanced forms of public transit.

Significant barriers inhibit transit innovation in American cities:

- the complexity of the local transit decisionmaking process;
- insufficient markets, which are too limited for the competition;
- Government-subsidized foreign competition;
- risks of technological failure and poor system management;
- risk of adverse publicity, cost overrun, and political embarrassment;
- the cautious approach to innovation of local operators and decisionmakers;
- the overriding concern at the local level for solving immediate problems versus long-run planning;
- adverse procurement regulations that discourage innovation; and
- frequent changes in Federal regulations that may not give suppliers large enough production runs to justify their investment in design and tooling.

The examination of foreign competition in automated guideway technology reveals that practical operating experience rather than technological issues should maintain a domestic preference for American systems over the next few years. However, this may change as claims for the West German Cabintaxi become verified in actual operations.

Rather than have UMTA justify to its constituency of transit operators, urban mayors, and current users the long-range benefits of developing AGRT or of the related technologies, it may be more advantageous for an agency such as the National Science Foundation, or other high-technology agency, to make the arguments for financial support and bear the responsibility for failure or success. A second option would be to decentralize responsibility for transit R&D. These and other options deserve further study.