

## The Fortunes of PRT in the United States

J. E. Anderson

The Urban Mass Transportation Act of the United States Congress, which was approved in 1964, included a Section 6 entitled Research, Development, and Demonstration Projects. The key paragraph of that section read as follows:

"The Secretary shall undertake a study and prepare a program of research, development, and demonstration of new systems of urban transportation that will carry people and goods within metropolitan areas speedily, safely, without polluting the air, and in a manner that will contribute to sound city planning. The program shall (1) concern itself with all aspects of new systems of urban transportation for metropolitan areas of various sizes, including technological, financial, economic, governmental, and social aspects; (2) take into account the most advanced available technologies and materials; and (3) provide national leadership to efforts of states, localities, private industry, universities, and foundations."

This Act led to a series of 17 studies by research institutes and corporations that led in 1968 to a 100-page summary report entitled *Tomorrow's Transportation: New Systems for the Urban Future*. The report defined the system called Personal Rapid Transit (PRT), which consists of fully automated minimum-sized vehicles operating between off-line stations on special, minimum-sized guideways. A summary paper on the work General Research Corporation of Santa Barbara on the Act was published in the July 1969 issue of *Scientific American*. The authors concluded that if only conventional transit were to be used, congestion would steadily worsen, but if PRT systems were gradually introduced, congestion could be contained. The studies resulted in a plethora of interest from all over the industrialized world, but with such a diverse range of ideas that planners became confused and many refused to consider any of the new ideas. While ground work had been laid, much needed to be done to sort through the various concepts and to develop theory that would assist in selecting among a huge array of possible alternative system features. In 1978 I published a book *Transit Systems Theory*, and in the following decades advanced the ideas to over 1400 pages of system and component analyses. Some of my papers can be found on the web page given below.

I became aware of the federal work in late 1968 and soon, with 15 colleagues, received a grant of \$50,000 from the Minnesota State Legislature "for the development and planning of a demonstration project for an advanced form of public transportation." After several years of study, site visits to a half dozen groups involved in PRT research, and our own research, we proposed to demonstrate the PRT system then under development by The Aerospace Corporation of El Segundo, California. With substantial assistance from the University of Minnesota's Department of Conferences, we held and I chaired International Conferences on PRT in 1971, 1973, and 1975, which produced 156 papers by 226 authors in three volumes that can be found in many libraries. The staff of the newly formed Urban

Mass Transportation Administration (UMTA) contributed some of the published papers and participated in the Planning Committee. Additional conferences sponsored by UMTA and by the Advanced Transit Association, which was formed following the 1975 conference, added significantly to the literature base.

Yet here we are in 2015 finding that, while almost all of the PRT system concepts came from the United States, PRT systems are now in operation in England, United Arab Emirates, and South Korea, but not in the U. S., notwithstanding substantial interest expressed by leaders in dozens of potential applications, mostly but not entirely in the United States. The automated transit system that operates in Morgantown, West Virginia, is called PRT but uses 20-passenger vehicles. Its safety record has been outstanding and has contributed importantly to the viability of automatic control in urban transportation; but, mainly because of use of vehicles that are much too large, its cost overrun discouraged Congress. Many planners have stated to me that before they decide to acquire a PRT system they must first see the new cost-effective PRT system demonstrated, and the challenge has been to find the funds to do so.

Notwithstanding marked advances in aviation, telecommunication and other fields, almost the only methods of urban transportation now in operation use concepts that go back well over a century. As a result we are mired in traffic jams. We have no choice but to breathe foul air. We worry about civilization's influence on the climate. We are captive to the price of oil. We are concerned with the lack of equity in our society because of the large number of people who cannot or should not drive. We witness an appalling number of people killed and injured in auto accidents. We worry about urban sprawl.

We are today optimistic that we will find private funds to demonstrate what we believe to be the most promising ideas, but that has not yet occurred. A likely reason is that since the 1980s, largely as a result of failure of federal demonstration programs, our federal government has stopped investing in new systems of urban transportation while states had become accustomed to looking to federal leadership.

For decades a relatively small number of engineers, planners and public citizens have understood in increasing detail that marked improvements in urban transportation require some form of PRT. Short of teleportation it is the logical result of searches for the ultimate solution. Many PRT systems have been proposed, unfortunately almost all hurriedly designed and flawed in one way or another to the point that many planners and public officials believe that the promise of the new mode has faded. Nonetheless, results of decades of work on the technology and planning of PRT have convinced my colleagues and me that optimally system-engineered PRT holds great promise for our future. In many applications we have found that such a system will pay all of its costs out of revenues from passengers, freight hauling, and focused advertising. Moreover, by requiring only a small fraction of one percent of the urban land area, significant congestion mitigation becomes practical. A federal official has called our version of PRT "an essential technology for a sustainable world."

## My Involvement in the Development of PRT

J. E. Anderson

- 1970-1974: University of Minnesota Task Force on New Concepts in Urban Transportation, an interdisciplinary team of 15 professors from engineering, architecture, urban planning, economics, sociology, psychology, and public affairs that I coordinated. Became immersed in PRT concepts.
- 1971: Formed, led, and published proceedings of the National Conference on Personal Rapid Transit – 28 papers.
- 1971-3: Developed proposal to demonstrate The Aerospace Corporation PRT in Minnesota. Delivered to the Legislature.
- 1972: President Nixon announces High-Capacity PRT program in State of the Union Address, but his own DOT ignored it. A long struggle ensued leading to the NASA Advanced PRT Program. I was invited to Chair an Overseeing Committee.
- 1973: UMTA announces to Congress: “A DOT Program leading to the development of a short, one-half to one-second headway, high-capacity PRT system will be initiated in fiscal year 1974.” It was lobbied to death by the conventional transit industry and was dead by September 1994.
- 1973: Formed, led, and published proceedings of the 1973 International Conference on Personal Rapid Transit, Minneapolis – 77 papers.
- 1974: The Minnesota State Legislature passed S.F. No. 2703 Chapter No. 573, an Act directing the MTC “to plan an automated small vehicle fixed guideway system.” There were two bidders: The Aerospace Corporation and a consulting firm that wished the idea of PRT would go away. The MTC picked the latter, who used the much-to-expensive Morgantown system as the model, which showed as would be expected that PRT is too expensive.
- 1974-5: Consulted for the Colorado Regional Transportation District on the largest study of transit alternatives performed in the USA after Denver citizens had been told that PRT would be the major option. It ended up being too early for the transit industry, and I left for Raytheon.
- 1975: Formed and led the 1975 International Conference on Personal Rapid Transit, held in Denver – 60 papers.
- 1975-6: Consulted for Raytheon Company Transportation Group, Bedford, Massachusetts on program to develop PRT. At the last minute the needed funds were diverted to a proposal for a new air-to-air missile.
- 1976: Helped organize and was voted first President of the Advanced Transit Association.
- 1976-77: Developed and published the textbook *Transit Systems Theory*, Lexington Books, D. C. Heath and Company, 1978.
- 1977-1979: Consulted for DEMAG+MBB as U.S. Representative for Cabintaxi PRT until that program was canceled by a new administration to divert money to other programs.
- 1978-1980: Consulted for State of Indiana on planning for PRT in Indianapolis based on Cabintaxi PRT System via Anderson-MacDonald, Inc.
- 1981: Initiated design of new High-Capacity PRT system at the University of Minnesota.
- 1982: Filed 5 patents on the new system. Given a U of MN \$100,000 patent development grant.
- 1982: Indianapolis leaders met with University of Minnesota administrators. The Indy leaders had been immersed in PRT with me for 8 years but U of MN administrators were new to PRT. Was like oil and water. Cooperation collapsed. Terrible loss.
- 1983: Formed Automated Transportation Systems, Inc. to develop the system.
- 1984: Dr. John Silber, President of Boston University invites me to join BU Faculty.
- 1984-5: Worked with Davy McKee Corporation in Chicago to develop system specifications, costs, and program plans. They invested about \$700,000 but Davy Corporation declined interest.

- 1986: Stuart Watson, Grandson of IBM Founder, took over our company and named it Taxi 2000 Corporation. Later in year he resigned to form a new company to absorb T2C, making me CEO of Taxi 2000. Prospects in Minnesota not favorable so I left for Boston University.
- 1986-9: As an engineering professor at Boston University, I formed Boston-Area industry team to further develop the system and to do application studies in cooperation with Raytheon Company. Led in May 1989 to interest of Chicago Regional Transportation Authority.
- 1987-9: Worked with Harvard Graduate School of Design on several city-development projects using PRT.
- 1989: Visited by Manager of Parks Operations Research, Disney Florida, who described many applications of my system in Disney World. Last of many questions: "Who will build it?" Not answerable then.
- 1990-1991: Participated in \$1.5 million PRT design study for the Chicago RTA led by Stone & Webster. The RTA published a glowingly positive monthly newsletter called "PRT UpDate."
- 1992: I gave presentations at SeaTac and Tacoma, WA, result in \$300,000 study of PRT for Seattle-Tacoma International Airport. Although consultant quadrupled our costs, we won over busses and light rail.
- 1993-5: Consulted for Raytheon Company on PRT design program for RTA that led to a test track of cars and guideway much too large and too expensive to be practical. Our concerns ignored.
- 1995-7: Consulted for Korean company Woo Bo on PRT development program.
- 1997-8: Work with Cincinnati Advanced Elevated Rail Committee resulted in their selection of my PRT system over 50 other elevated rail proposals. Was rejected by the Metropolitan Planning Organization because no demonstration system had been built.
- 1998: RTA drops consideration of Raytheon PRT program because of excessive cost.
- 2000-2002: Raised \$800,000 from friends to design, build and operate one automated, LIM-propelled PRT vehicle running on 60-ft guideway.
- 2003: Exhibited system at Minnesota State Fair where several thousands of people were given rides with no failures, after which we were visited by the Minneapolis Mayor, Council and staff. All they talked about was where to put our system, but no follow-up.
- 2005: For unbelievable reasons I resigned from Taxi 2000 and continued further development and marketing of system, which I now call ITNS.
- 2007: Law suit with Taxi 2000 settled favorably, leaving me free to continue work on PRT.
- 2008: Following presentation to Disney Imagineering, Glendale, CA, Disney wanted to consider ITNS for their Anaheim Theme Park, but we would need to build a demonstration system first.
- 2009: MnDOT holds forum on PRT in Rochester. I was thanked publically for work on PRT.
- 2009: I gave the paper "Overcoming Headway Limitations in PRT" at the PodCar Conference in Mölmo, Sweden.
- 2010: MnDOT holds Workshop on PRT at the University of Minnesota. PRT interest later blocked by LRT interests in Minnesota Legislature.
- 2011: Mayor of Rochester, MN, asks when Ed's PRT system will be ready.
- 2012: Executive Director of MSP states that he needs ITNS to bring people to the airport.
- 2012: Winnipeg interest in ITNS begins.
- 2014: Winnipeg Mayor writes letter stating that he will purchase a \$300M ITNS once it is tested, but the investment source did not come through.
- 2015: Investment firm says that they will fund our demonstration program once we have obtained a Standby Letter of Credit for \$3,000,000. Prospects look good.