



Online Ethics Center  
FOR ENGINEERING AND SCIENCE

# Max Blankenzee, Robert Bruder, and Holger Hjortsvang -- (Barus Awardees 1978)

## Author(s)

Stephen H. Unger

## Description

Max Blankenzee, Robert Bruder, and Holger Hjortsvang jointly received the first Award for Outstanding Service in the Public Interest (now deemed the Carl Barus Award) given by the IEEE Society on Social Implications of Technology in 1978. This account of their story is excerpted from the book *Controlling Technology: Ethics and the Responsible Engineer*, by Stephen Unger.

## Body

### **THE BART CASE**

The following account of the Bay Area Rapid Transit case originally appeared in the September 1973 Newsletter of the IEEE Committee on Social Implications of Technology (CSIT) and was subsequently reprinted in several other places.

---

There has been a upsurge of discussion recently about the status of engineering as a profession, the obligations of the engineer toward the public, and the relationship of the engineer to his employer. Some very important facets of these questions are

illuminated by the fate of three engineers employed by Bay Area Rapid Transit (BART).

A few words about the structure of BART will be useful as a background. (The recent series by Gordon Friedlander (2) constitutes an excellent description of the overall project.) BART is a fast (80 mi/h top speed) modern rail transit system, with 34 stations and 75 miles of track, serving the counties of San Francisco, Alameda, and Contra Costa. Ownership and control are vested in the Bay Area Rapid Transit District (BARTD), created by public statute in 1957 and governed by a 12-person Board of Directors, four from each county. It is financed by public funds.

Construction began about 1963 and the overall cost is now estimated at about 1.5 x 10<sup>9</sup> dollars (1). Partial revenue service commenced, between Oakland and Fremont, on September 11, 1972, almost three years behind schedule (1).

A consortium of three engineering firms, referred to as Parsons, Brinkerhoff-Tudor-Bechtel (PBTB), was retained by BART to direct and engineer the construction of the system. They in turn contracted out various phases of the operation to other firms. In particular Westinghouse Electric Corporation, on the basis of competitive bidding, was awarded (in 1967) a \$26 million contract to design, install, and operationally qualify the Automated Train Control (ATC) System (1).

BART itself has an engineering staff whose functions include system maintenance and operation, surveillance and status checking of construction, approval of design changes, and general investigation of problem situations.

The following account is based on a collection of over 40 documents including letters, memos, newspaper articles, and reports, ranging in length from a few paragraphs to over 100 pages. These were acquired principally through correspondence. Because it was not feasible to interview the participants (even by phone), certain details have not been clarified. However, these are not important enough to affect the overall picture that emerges. The same is true for a few pieces of information that were given to the writer in confidence; these only serve to reinforce the impressions created by other information.

## **THE EVENTS**

**Holger Hjortsvang**, a systems engineer in the BART Maintenance Section since 1966, and a senior member of IEEE, was involved with the ATC system. He became, over a period of years, increasingly concerned with the way the development of this system was progressing. He felt that BART had no internal structure adequate to monitor this phase of the project, relying instead on PBTB, who were also not set up to oversee this task (3).

In part as a result of his having been sent to work for ten months with the Westinghouse Computer Systems group responsible for ATC, Hjortsvang had grave doubts about the success of this phase of the project (4, 5). He expressed these concerns to his superiors both orally and in a series of five written memorandums dating back as far as April 1969 (7). In one of these reports criticizing the ATC system, he predicted a mean time between failures (each stopping a train) of three and a half hours when the system was in full operation (4,5). There was no significant response from his management.

**Max Blankensee**, a programmer analyst working with Hjortsvang since 1971, had a similar experience. His memos to his superiors criticizing various aspects of the ATC development drew only vague verbal responses and warnings not to become a "troublemaker" (5, 7).

Meanwhile, in BART's Construction Section, **Robert Bruder**, an electrical engineer monitoring various phases of the project since 1969, was growing increasingly disturbed about the "unprofessional" manner in which the installation and testing of control and communications equipment was being supervised by both BART and PBTB, as well as the obviously unrealistic opening dates being released to the public. His management was also not responsive to his expressed concerns (6).

Toward the end of 1971 the three engineers decided that in the public interest they must take steps to have their concerns dealt with seriously. Accordingly they made contact with Daniel Helix, a member of the BART Board of Directors, told him about the problems they were encountering, and gave him some written material. Mr. Helix expressed interest and was persuaded that action was needed. He conferred with two other board members and gave copies of a report on the subject to the entire board and the top management of BART (4-7).

The next step (and the elapsed time here is not clear) was the release to the press by Mr. Helix of the news of the controversy (7-9). This was followed by a public

meeting on February 24 (or February 25) of the BART board at which presentations were made by Edward Burfine, a consulting engineer engaged by either Helix or the three engineers (possibly both --- another unclear point) to present the criticisms of the handling of the ATC development, and by representatives of PBTB and Westinghouse in defense of their approach (4,7). The board voted ten to two (one source said eight to two) in support of BART's management, in effect rejecting the criticisms.

Apparently the identities of the three who initiated the controversy had not been made public, and BART's management now proceeded to identify them (6,9). On March 3, Hjortsvang, Blankenzee, and Bruder were given the options, of resigning or being fired. Upon refusing to resign, they were summarily dismissed with no written reasons being given (5-7,9).

On February 23 (just prior to the public meeting of the board) Bruder, a member of the California Society of Professional Engineers, telephoned CSPE President William F. Jones, outlined the situation as it then stood, and asked for support. Mr. Jones immediately contacted the Diablo Chapter of CSPE (to which Bruder belonged) and, along with the leaders of that chapter, initiated a thorough study of the situation. Subsequent to the discharge of the three engineers, Jones (on March 13) attempted to reach B. R. Stokes, BART's general manager. (All accounts attribute the Firings to Stokes' initiative.) Jones was never able to reach Stokes. He did speak to Chief Engineer David Hammond, who expressed surprise that CSPE should be interested in the situation.

BART's top management declined to meet with CSPE (112). Requests by the fired engineers for hearings on their case, or even for written statements of the charges justifying their dismissals, met with no response, and in fact BART has refused to issue any explanation to anyone (6,7, 9-12). (Of three letters of inquiry I wrote to various BART manager--- including Stokes---who were involved in the case, only one reply has been received. This was a refusal by Blankenzee's supervisor to provide any explanation, on the grounds of pending legal action (13).)

A full investigation of the firings, the conduct of the three engineers, and the substance of their concerns about the BART project was then undertaken by CSPE. President Jones stated (10) that he and other CSPE members (Gilbert A. Verdugo, state director Diablo Chapter CSPE, and Roy A. Anderson, chairman of CSPE's Transportation Safety Committee, also played major roles) involved in the case were

"convinced that the three engineers acted in the best interest of the public welfare in disclosing to the BART Board of Directors problems regarding train control, systems management, and contractual procedures. "He also stated that "a large volume of most distressing information on the employment practices of BART, and on its apparent disregard for public safety, has been gathered."

On June 19, 1972, a report of CSPE's findings authored by Roy Anderson and entitled "The BART Inquiry" was submitted to the California State Senate. At about the same time, the Diablo Chapter of CSPE circulated a public petition calling for a wide-ranging investigation of BART by the state legislature (a number of specific charges were made, but the case of the fired engineers, and employment practices in general were not mentioned) (9). CSPE also took some tentative steps toward a court action on behalf of the fired three, but never did follow through on this (9).

The state legislature did investigate, producing what is known as the Post Report (1). It acknowledges the CSPE report as its starting point. Several instances of mismanagement of the project are pointed out, although no mention is made of employment practices or of the three men whose initial warnings led directly to the Legislature's investigation.

The Post Report (1), a further study by a special panel of distinguished engineers (14), and several other independent studies all confirmed, in general outline, the concerns expressed by Bruder, Hjortsvang, and Blankensee. A great deal of information pointing to poor engineering design was uncovered. A more dramatic confirmation occurred on October 2, 1972, when a BART train overran the station at Fremont as a result of an ATC failure and several passengers were injured (2). This occurred just three weeks after the initiation of partial revenue service.

At this writing, the BART ATC is still under a cloud, with the trains being controlled ultimately in the traditional manner (2). The three engineers are now suing BART for damages totalling \$885,000. They charge breach of contract and deprivation of constitutional rights. Blankensee also charged that BART officials intervened on several occasions to discourage prospective employers from hiring him on the grounds that he was a "troublemaker" (15).

## **COMMENTS AND CONCLUSIONS**

The code of ethics of the NSPE states that the engineer "will regard his duty to the public welfare as paramount" and that "he will notify the proper authority of any observed conditions which endanger public safety and health. "The Employment Guidelines approved by many engineering societies, including IEEE, and published in the May 1973 issue of *Spectrum* are also highly relevant<sup>1</sup>. The facts related above indicate that Hjortsvang, Blankensee, and Bruder acted in a manner fully consistent with the letter and spirit of this code and guidelines, a conclusion also attested to by the CSPE. There is no indication that they did anything in this situation that could reasonably be called improper. When they felt it necessary to depart from normal administrative channels, they addressed themselves to the BART Board of Directors, an action difficult to interpret as irresponsible. (An interesting sidelight on the cautious approach of at least one of the three was provided by reporter Justin Roberts of the Contra Costa Times (16). He stated that he met Robert Bruder some months prior to the firings, and having heard, from other sources, of trouble in BART, "attempted to pump him." "He politely but firmly rebuffed my efforts." Only after the matter became public knowledge, did Bruder speak to the press.)

Dr. Willard H. Wattenburg, a consultant who looked into the matter, referred to Holger Hjortsvang as "one very honest engineer" who was "ruthlessly sacrificed." Nevertheless, having performed an obvious public service in the highest tradition of engineering, the considerable personal sacrifices of Blankensee, Bruder, and Hjortsvang have been largely ignored in the reports that subsequently validated their claims. Only the CSPE showed any concern for them, and this group was apparently unable to take effective action on their behalf.

Unfortunately, the BART case is not a unique example of employed engineers being forced to choose between compromising their ethics or seriously jeopardizing their careers. It is imperative that the engineering profession develop institutional means for eliminating such dilemmas. The working Group on Ethics of IEEE CSIT is now exploring proposals toward this end and a progress report will appear in a future issue of CSIT Newsletter.

## **ACKNOWLEDGEMENTS**

The author's efforts to gather material on this subject were significantly facilitated by the cooperation of Messrs. Gordon Friedlander (IEEE Spectrum), Gilbert Verdugo (CSPE), and Justin Roberts (Contra Costa Times).

## SOURCES AND REFERENCES

1. A. A. Post, "Investigation of the operation of the Bay Area Rapid Transit District with particular reference to safety and contract administration," California State Legislature, Nov. 9, 1972.
  2. G. Friedlander, Series of five articles on BART, IEEE Spectrum, Sept. 1972, Oct. 1972, Nov. 1972, Mar. 1973, Apr. 1973.
  3. H. Hjortsvang, "BART System Engineering," memorandum to Director Daniel Helix, Nov. 18, 1971.
  4. ---, Memorandum to CSPE attorney, Mar. 7, 1972.
  5. J. Roberts, News article, Contra Costa Times, Mar. 7, 1972, p. 1.
  6. R. Bruder, Letter to author, June 10, 1973.
  7. R. Vogt, News article, Contra Costa Times, Mar. 8, 1972.
  8. H. Hjortsvang, Letter to author, June 26, 1973.
  9. "BART in Perspective," Editorial, California Professional Engineer, pp. 4-6, Mar.-Apr. 1973.
  10. W. F. Jones, "The BART Affair," a printed document of the CSPE, undated, received from Mr. Verdugo.
  11. "CSPE Action to Protect Engineering Employees," a typed CSPE document, undated, received from Mr. Verdugo.
  12. R. A. Anderson and G. A. Verdugo, "The BART Inquiry," (Not the report to the Senate referred to later), a typed CSPE draft, received from Mr. Verdugo.
  13. E. F. Wargin, BART Superintendent of Maintenance Engineering, Letter to author, June 14, 1973.
  14. B. Oliver, C. Lovell, and W. Brobeck, "Report on Safety of the Bay Area Rapid Transit Automatic Control System," prepared for the State of California Senate Public Utilities and Corporations Committee, Jan. 31, 1973.
  15. J. Roberts, News article, Contra Costa Times, May 20, 1973, p. 1.
  16. J. Roberts, Letter to author, May 25, 1973.
  17. W. Wattenburg, Letter to author, May 16, 1973.
-

Some fascinating insights into the quality of the engineering of BART's automatic train control system can be found in the letter (see Appendix II 1) by Bernard Oliver, a distinguished engineer and former president of the IEEE, who served on a three-member panel of experts commissioned by the California State Senate to review the system. After the expenditure of additional millions of dollars, the BART system now provides very good service, though maintenance remains a problem.

Following the appearance of my article, the BART case was discussed intensively within the IEEE. In March of 1974, a two-part resolution was passed by CSIT, which called on IEEE's board of directors (BOD) to set up machinery to support engineers whose acts in conformity with ethical principles may have placed them in jeopardy and, in the interim, to intervene on behalf of the three BART engineers. The BART issue was also considered by the Ethics and Employment Practices Committee (EEPC) of the IEEE U.S. Activities Committee. A subcommittee appointed to consider the matter reviewed the file on which the CSIT article was based. As a result of this review, the EEPC endorsed the CSIT position.

The Executive Committee of the BOD responded by appointing its own subcommittee to consider the matter. This eventually led to the IEEE's filing an amicus curiae brief (see Appendix 11.2) on behalf of the three engineers in their civil suit against BART. The brief deals not with the facts of the case, but with the broad ethical principles involved. The court was urged to rule that an engineer's employment contract includes an implied term that he will protect the public safety and that discharging an engineer for adherence to this term should constitute a breach of contract by the employer.

Shortly after the filing of this brief on January 9, 1975, BART offered the three engineers an out-of-court settlement (reported to be \$75,000). A combination of financial hardship and uncertainty as to the outcome of a trial, the latter compounded by a weakness in their case (the engineers had falsely denied to management that they were the instigators of Helix's intervention) induced the three to accept the settlement. An unfortunate consequence is that the opportunity to establish a legal precedent based on the IEEE brief was thereby forfeited. The principle involved was however taken further in the Grace Pierce case decided in 1980 (see Section x.x).

Subsequent action by the IEEE related to the matter of general support in such cases is discussed in Section 4.3. Suffice it to say here that, in addition to the direct benefits that accrued to the public as a result of the alarm sounded by Hjortsvang,



Bruder, and Blankensee, their action significantly advanced the cause of engineering ethics within the IEEE and other engineering societies. In 1978 they jointly received the first IEEE CSIT Award for Outstanding Service in the Public Interest, consisting of a certificate and \$750 for each.

## Notes

This story is an excerpt from:

- Unger, Stephen. *Controlling Technology: Ethics and the Responsible Engineer*. 2nd Ed., Wiley, 1994. Chapter 2 Section 3.

## Contributor(s)

Stephen H. Unger

## Rights

Use of Materials on the OEC

## Resource Type

Case Study / Scenario

## Parent Collection

Award Winners

## Topics

Public Health and Safety

Whistleblowing

## Discipline(s)

Systems Engineering

Engineering