

Smart Parking: Lessons Learned from the San Francisco Bay Area Field Test



Susan Shaheen, Ph.D.

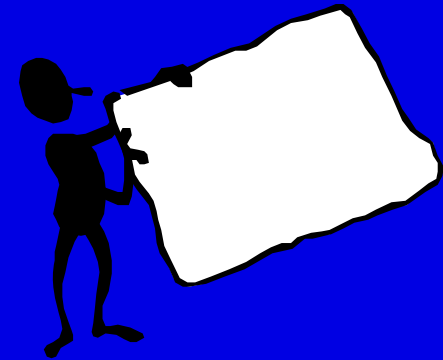
**Transportation Sustainability Research Center,
UC Berkeley**

*On the Road to Sustainability: From Research to
Practice*

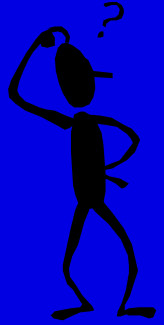
October 30, 2007

Overview

- **Problem**
- **Potential solution**
- **Background**
- **Technology**
- **Behavioral impacts**
- **Lessons learned**
- **Conclusions and next steps**

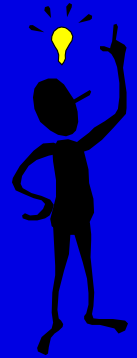


Problem



- **Peak hour parking is at or near capacity at most suburban BART stations.**
- **Expansion of traditional parking facilities can be cost prohibitive.**
- **In suburban areas, quick, convenient access to park-and-ride lots is essential to making transit competitive with the auto.**
- **More efficient management of valuable resource**
- **Wasted fuel and air pollution (searching)**

Potential Solution



- **Smart parking has been successfully implemented in European, British, and Japanese cities to more efficiently use parking capacity at transit stations.**
- **Systems typically provide real-time information via CMSs to motorists: number of available parking spaces in lots, departure time of next train, and downstream roadway traffic conditions.**
- **Could daily smart parking (peak period) complement a monthly reserved program by providing daily flexibility during the AM commute to those who do not use transit everyday?**

Project Partners

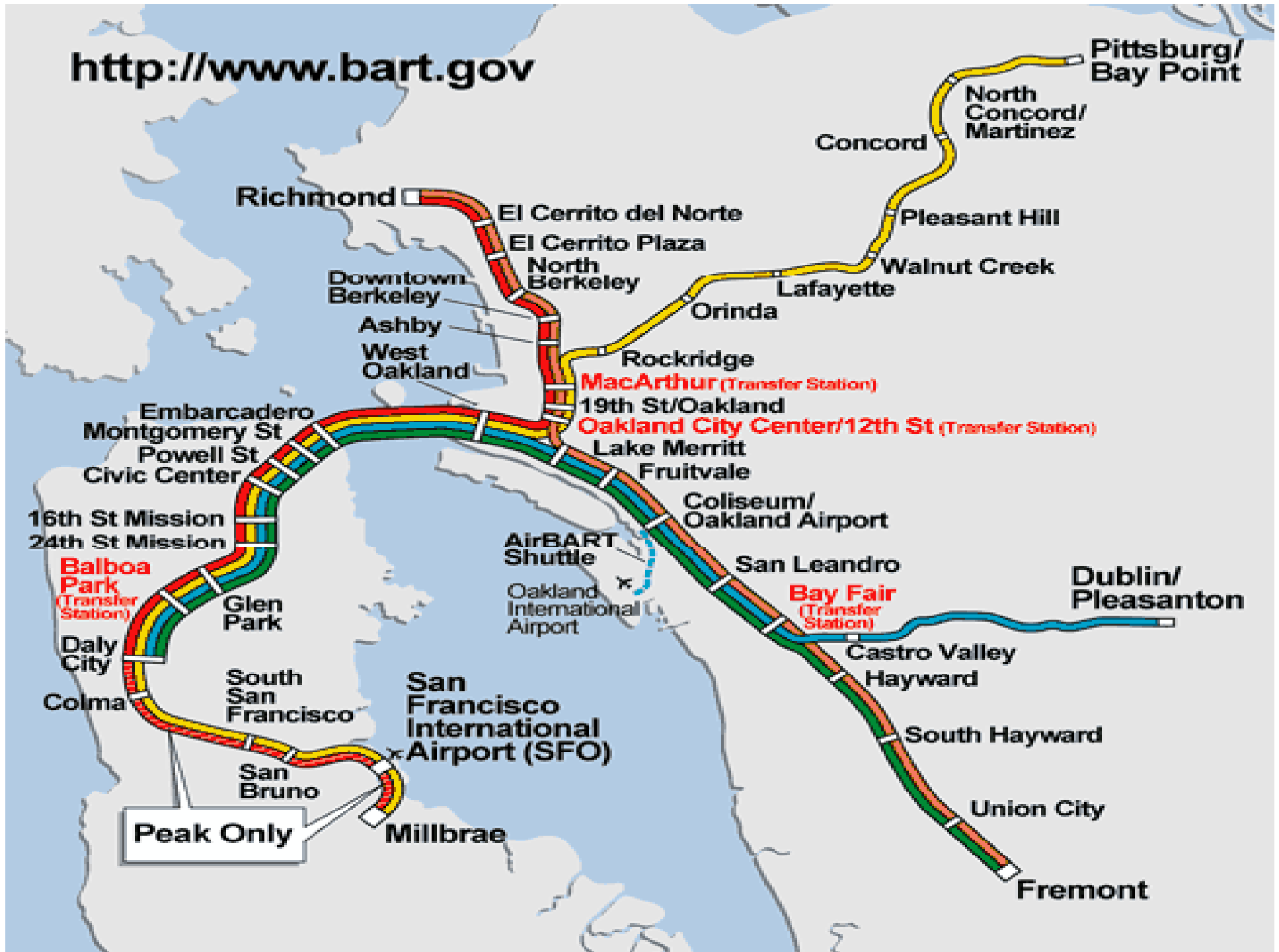
- **California Department of Transportation**
- **Bay Area Rapid Transit (BART) District**
- **California PATH**
- **ParkingCarma, Inc.**
- **Quixote Corporation**
- **Intel**
- **Microsoft**

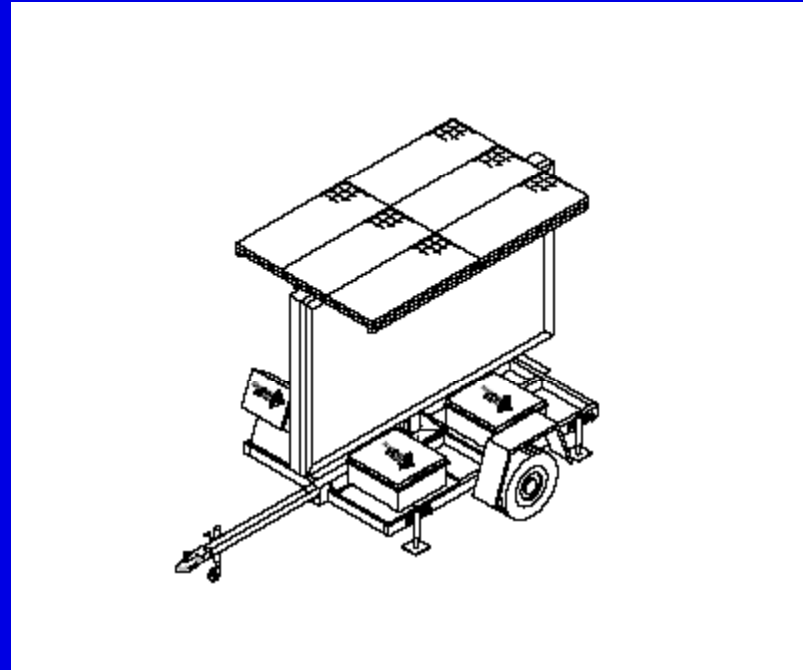


**The field test was
launched at the
Rockridge BART station
in December 2004 and
ended April 2006.**



<http://www.bart.gov>





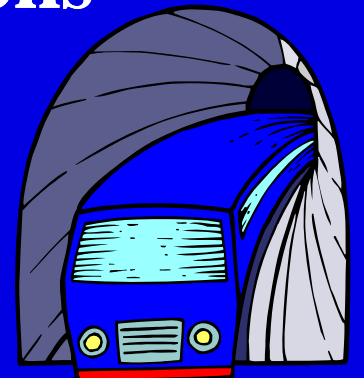
Background



- The field test was the first transit-based smart parking program in U.S.
- Similar transit-based systems outside of the U.S. provide motorists with en-route information.
- At the time of field test, we were not aware of any program with *both pre-trip and en-route planning and billing*.
- Project received the 2005 “Best of ITS America” award in the research category.

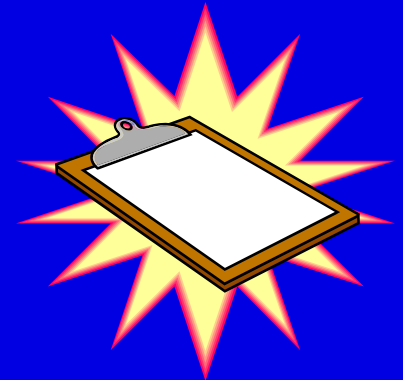
Field Test Parameters

- **Operated from 7:30 to 10:00 am**
- **50 of 862 spaces at Rockridge BART for the project**
- **35 spaces for drive-in**
- **15 spaces for advanced reservations**
- **5 space buffer**
- **Use restriction: 3 advanced reservations every 2 weeks**



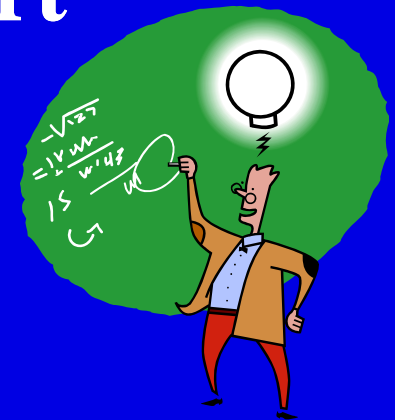
Focus Groups & Final Survey

- **Two “interim” focus groups held in May 2005**
 - **23 total participants**
- **177 web-based final surveys completed by field test participants in early 2006**
 - **36% response rate**



Key Findings

- **During 16-month field test, over 13,000 successful parking events**
- **Attracted new user population to BART**
- **49% of respondents would not have used BART to commute, if smart parking were not available.**



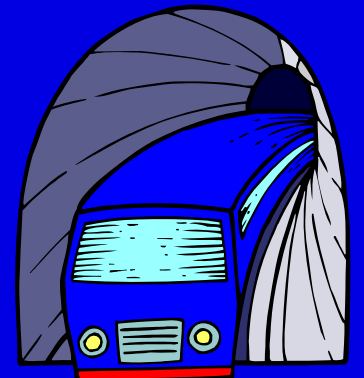
Key Findings (cont'd)



- **Smart parking may have increased transit use for non-work travel**
 - **A significant correlation was found between frequency of BART commute and transit use for non-work travel.**
- **Parents used smart parking to meet morning childcare schedules and commute by BART.**

Change in Mode Choice

- **Sizable increases in BART mode share**
 - An average increase of 6 and 4 more BART trips per month for on-site and off-site commutes, respectively
- **Shift from drive alone mode share to BART**
 - 31% and 56% diverted from driving alone to on-site and off-site work locations to BART, respectively



Change in Vehicle Miles Traveled

- **The average participant reduced monthly VMT by 9.7 miles.**
 - **Approximately 33% of VMT change was offset by an increase in driving to station and driving further to Rockridge instead of a closer BART station.**
 - **On average, commute time using smart parking and BART was 2.6 minutes shorter.**



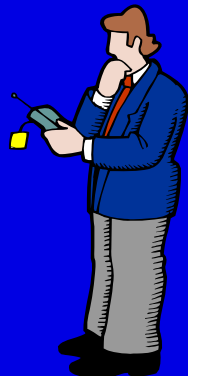
Changeable Message Signs (CMSs)

- Operated 7:30 to 9:40 am Monday to Friday
- CMSs were underused:
 - 39% of survey respondents reported seeing a CMS.
 - Only 12% of focus group participants and 13% of survey respondents used the CMSs in their decision-making process.
- Key issues from focus groups:
 - Placement, message content & accuracy



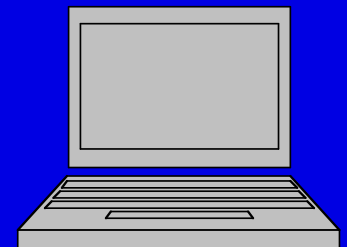
Interactive Voice Response (IVR)

- **Facilitated 69% of parking events during project duration**
- **Key IVR issues from survey:**
 - **Noisy environment at transit station made it hard to hear.**
 - **Long introductory message for repeat users**
 - **Difficulty having the IVR system voice (“Kate”) repeat or confirm information**
 - **Verbal commands were difficult – numerical keypad option suggested.**



Web Site Reservations

- **Facilitated approximately 31% of parking reservations**
- **Survey respondents noted difficulty creating an online account.**
- **75% of respondents reported that they never encountered a situation where their advanced reservation had been taken by another vehicle.**



Parking Fees



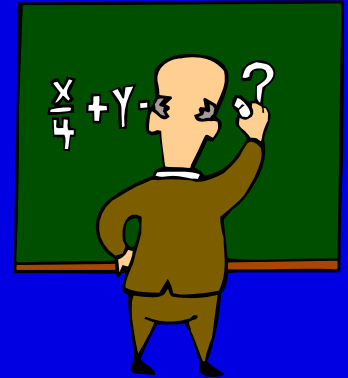
- **Implemented in October 2005, 10 months after field test began**
- **Advanced = \$4.50/day; Drive-in = \$1.00/day**
 - **64% of survey respondents did not stop using smart parking when fees were introduced.**
 - **43% of respondents reported using advanced less frequently than drive-in reservations after fee implementation.**

Smart Parking Enhancements

- **Survey respondents recommended:**
 - **Better fixed signage to designate parking spaces**
 - **Spaces closer to the entrance**
- **Focus group participants suggested:**
 - **Less restrictions on advanced reservations**
 - **Increase number of smart parking spaces and/or hours of operation; expand smart parking to more stations**



Conclusions



- **Field test benefits:**
 - **Reduced drive alone modal share**
 - **Increased transit modal share**
 - **Reduced commute travel time**
 - **Reduced vehicle miles traveled.**
- **The IVR and web site reservation systems facilitated over 13,000 reservations. When fees were implemented, the number of advanced reservations decreased, while drive-in reservations increased.**



Next Steps

- **Smart parking located along the San Diego Coast Express Rail (COASTER) route**
 - **Three-year pilot project funded by Caltrans, PATH, and FHWA at 5 stations**
 - **Value pricing component**
- **RFID project at a BART station in Bay Area**
 - **Partnership among Caltrans, PATH, BART, SoftLogistics, and ParkingCarma, Inc.**
 - **Vehicle and handheld RFID tags will register parking events**

Acknowledgments



- **California Department of Transportation**
- **Bay Area Rapid Transit (BART) District**
- **California PATH**
- **ParkingCarma, Inc. & Quixote Corporation**
- **Intel & Microsoft**
- **Caroline Rodier, Linda Novick, Elliot Martin, Charlene Kemmerer & Megan Smirti**



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