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# **Orange County Transit Probe Evaluation: Phase I Institutional Findings**

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**California PATH Working Paper  
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**ORANGE COUNTY TRANSIT PROBE EVALUATION:  
PHASE I INSTITUTIONAL FINDINGS**

**March, 1997**

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## TABLE OF CONTENTS

Executive Summary .....	4
1 Introduction .....	5
1.1 Project History.....	5
1.2 Project Governance .....	6
2. Interviews.....	7
2.1 Organization and Performance .....	7
2.2 Institutional Issues and Barriers.....	10
2.3 Objectives.....	10
3. Conclusions .....	11
4. References.....	12
5. Appendix: Interview Guide.....	13

## LIST OF TABLES

1. Participants Interviewed.....	8
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## **ABSTRACT**

The Orange County probe project is a multi-agency project intended to equip a fleet of buses with GPS (global positioning system) based tracking equipment, and to use tracking data for multiple purposes: (1) bus schedule adherence and fleet management, (2) collection of information on roadway traffic congestion, (3) dissemination of transit data to patrons. This is the first report of a multi-phased evaluation of the project. The report documents institutional issues facing the project up to Fall of 1996. To date, the probe project has proceeded in a fairly routine fashion, a clear accomplishment for a multi-agency project. The major question mark is whether the tracking data can be effectively integrated into existing traffic and transit systems. While largely a technical issue, the success will depend in part on whether contracts can be written with sufficient precision to ensure that the system fulfills project objectives.

**Keywords: Transit, Global Positioning, Institutional Issues**

## EXECUTIVE SUMMARY

The Orange County probe project is a joint effort of the Orange County Transit Authority (OCTA), California Department of Transportation (Caltrans) and the cities of Anaheim and Santa Ana. The project is intended to equip a fleet of buses with GPS (global positioning system) based tracking equipment, and to use tracking data for multiple purposes: (1) bus schedule adherence and fleet management, (2) collection of information on roadway traffic congestion, (3) dissemination of transit data to patrons.

The project is being evaluated by California PATH and the University of Southern California, under contract to Caltrans. The evaluation contains three elements:

- 1) Institutional and operator
- 2) Traveler response
- 3) System performance.

This is the first report under the institutional and operator element. It documents interviews conducted between August and October 1996 with project participants. The interviews covered a range of issues related to project management, project objectives and institutional barriers.

To date, the probe project has proceeded in a fairly routine fashion, a clear accomplishment for a multi-agency project. This success can be attributed to clearly defined responsibilities, with OCTA serving the key project management role. The success can also be attributed to the efforts of the lead agency to keep all participants informed of progress and to its careful oversight of contract schedules and deliverables. It can also be attributed to the maturity and adequacy of commercial tracking and communication technology.

The major question mark for the project is whether the tracking data can be effectively integrated into existing traffic and transit systems. While largely a technical issue, the success will depend in part on whether contracts can be written with sufficient precision to ensure that the system fulfills project objectives.

## 1. INTRODUCTION

The Orange County probe project is a joint effort of the Orange County Transit Authority (OCTA), California Department of Transportation (Caltrans) and the cities of Anaheim and Santa Ana. The project is intended to equip a fleet of buses with GPS (global positioning system) based tracking equipment, and to use tracking data for multiple purposes: (1) bus schedule adherence and fleet management, (2) collection of information on roadway traffic congestion, (3) dissemination of transit data to patrons. The project is one of many cited in the Orange County ITS Strategic Plan (JHK, 1993; Transportation Corridor Consultants, 1996), and is intended to be integrated with several traveler information projects (including " " and other projects initiated in the City of Santa Ana and City of Anaheim).

The project is being developed in two phases. Rockwell has been contracted as the system manager, serving a technical consultant role. Some time in 1996, a system integrator will be selected to install and test equipment on buses, along with supporting software and workstations. The system was intended to be operational in the Spring of 1996. State funding is intended to support the operation over a test period, lasting until mid 1998.

The project is being evaluated by California PATH and the University of Southern California, under contract to Caltrans. The evaluation contains three elements:

- 1) Institutional and operator
- 2) Traveler response
- 3) System performance.

This is the first report under the institutional and operator element. It documents interviews conducted between August and November 1996 with project participants. The interviews covered a range of issues related to project management, project objectives and institutional barriers. The report is only intended to provide interim findings. The institutional element will be documented in full at the completion of the project.

### 1.1 Project History

The OCTA probe project grew out of informal contacts between the City of Anaheim, the Orange County Transit District (OCTD) and the Urban Mass Transit Administration (UMTA) around the year 1990. UMTA was impressed with Anaheim's traffic management center, and felt that similar centers could be developed for transit systems. To spur this effort on, UMTA funded OCTD and Anaheim to investigate joint opportunities for intelligent transportation systems in traffic and transit. The study, conducted by JHK and Associates, recommended a bus probe project as one of several ideas.

The probe project later crystallized in the form of a proposal to the Department of Transportation under its Field Operational Test program. By this time, OCTD had merged with the county's sales-tax transportation agency to form the Orange County Transportation Authority. Though the proposal was rejected under the FOT program, Caltrans felt the project meshed well with its CAPTS (California Advanced Public Transit Systems) program, and funded the project from its own funds (some of which come from Federal Transit Administration (FTA) sources; FTA is the successor to UMTA). One of the innovative features of the proposal was the dual use of bus tracking systems as traffic probes in addition to serving transit specific needs. Santa Ana was brought in at this time to broaden the project's base. The project commenced in late 1995 when OCTA issued a contract to Rockwell to serve as system manager.

The project is one element in the Orange County Intelligent Transportation Systems (ITS) plan. The project will be a data source for the Orange County "TravelTip" project, which is intended to provide a variety of traveler information services. The probe project is also intended to be a data source for traveler information kiosks being developed by the City of Anaheim and City of Santa Ana. The probe project is only loosely related to the Southern California Priority Corridor program and its "Showcase" collection of projects. The probe project precedes the Showcase projects, and may prove to be a testing ground for future multi-agency efforts in ITS.

## **1.2 Project Governance**

The Orange County Transportation Authority is the manager of the probe project, with Dean Delgado of OCTA's planning and development division serving as project manager. However, the system will be operated by OCTA's fixed route operations division, through its communications department. OCTA works under contract to Caltrans' Division of New Technology and Research, with Vicky Cobb serving as contract manager there.

The system design was developed by Rockwell's Autonetics Electronic Systems Division of Anaheim California under contract to OCTA, after being selected through a competitive bid process (Rockwell, 1995). Rockwell's work has included development of a system architecture, writing specifications, and preparing a scope-of-work statement for a system integrator (Rockwell, 1996a,b and c). In fall of 1996, a request-for-proposals was issued to select the system integrator to implement the project. The system integrator will be under contract in early 1997.

OCTA is advised by a project steering committee, with representatives from the City of Anaheim, City of Santa Ana, Caltrans District 12 and Caltrans Division of New Technology and Research (Sacramento), as well as by OCTA planning and development,



vehicle maintenance and communication. The meetings have also been attended by representatives from Rockwell and California PATH (evaluators). The steering committee is a purely advisory body: it takes no votes and serves primarily as a conduit for information exchange.

## 2. INTERVIEWS

Interviews were administered to seven members of the Steering Committee and a representatives from Rockwell in August to September 1996 (Table 1). Interviews were conducted in person where feasible. All but one were conducted by the author (one interview conducted by Mark Hickman of PATH). Interviews followed a set interview guide (Appendix), covering three basic topics:

- A) Organization and performance
- B) Institutional issues and barriers
- C) Objectives

Interviewees were asked about successes and shortcomings of the steering committee, critical issues and how they were resolved, institutional barriers, and achievement of project objectives (see appendix for complete list). Interviews typically lasted 45-60 minutes.

### 2.1 Organization and Performance

Project participants are generally satisfied with the project organization and management. OCTA was commended for its organization and for its efforts toward consensus building. Participants felt that OCTA had done an excellent job keeping its partners informed of progress and briefing them at major milestones. Meetings have been well organized and productive.

By way of improvement, some participants felt that they did not have sufficient opportunity to TravelTip provide input in earlier phases of the project, especially in concept development. These people felt that Rockwell had been too schedule driven, and had not put enough effort into soliciting the specific data needs of each partner. By this view, Rockwell had pushed too far along in the design without investing sufficient effort in developing user requirements, providing outreach, and fully studying the alternatives.

This view is somewhat reinforced by the structure of steering committee meetings, which tended to be formatted toward briefing participants on progress, rather than seeking their input or brainstorming on design. This is not meant to imply that Rockwell was not responsive to participant concerns. Rather, it means that meetings were formatted in a reactive rather than a creative mode, to the objection of some participants.

It should be noted that OCTA and Rockwell took great strides to distribute all documents in draft form for review. There is clearly some frustration that participants did not take up the invitation to provide input, and waited until many of the decisions had been locked in before raising concerns. OCTA also deserves praise for ensuring that the separate

concerns of participants did not unnecessarily impede progress on the design, or create an undue burden on the contractor.

**TABLE 1. PARTICIPANTS INTERVIEWED**

Jeff Coleman	Rockwell
Vicky Cobb	Caltrans Division of New Technology & Research (Contract Manager)
Dean Delgado	OCTA Planning (Project Manager)
Dennis Elefante	OCTA Vehicle Maintenance
Ed Khosravi	Caltrans District 12
Mark Lucy	OCTA Communications
Jim Paral	City of Anaheim
TC Sutaria	City of Santa Ana

The critical issues facing the project have been:

- Formatting data to be useful for partners
- System integration and information exchange
- Validity of methods for congestion measurement and schedule tracking
- Participation of system operators in project meetings.

The first two issues, which are closely connected, were addressed late in the project through three-way meetings between OCTA, Rockwell and the three traffic agencies (one at a time). The issue grew out of a misunderstanding as to the traffic agencies' capability for receiving, processing and displaying probe generated data. Rockwell had been working under the concept that the traffic agencies could usefully display probe data to their operators if delivered in a raw form. The traffic agencies felt that new software is needed for this purpose, and the cost of this software should be borne by the project. Furthermore, if the project did not pay for the software, then the probe data would not be used. Through the meetings, specific upgrades were identified, and OCTA agreed to finance the upgrades from its TravelTip program.

The third issue remains partially un-resolved. Concern remains that Rockwell should have developed and validated algorithms for measuring schedule adherence and computing congestion on roadway links as part of their contract. Rockwell has created a loose specification for the system integrator to develop congestion algorithms. This approach clearly has not satisfied some participants, as there is considerable skepticism that the integrator will be capable of developing an adequate methodology. In a more general sense, there is concern that Rockwell was too quick to reach conclusions on technical points that required more thorough analysis.

All three of these issues are related to the nature and specifics of the design and integration contracts. In hindsight, it may have been more effective to create a single contract with a single company to perform both tasks. This would have clarified contractual responsibilities, and eliminated the costs and delays of creating a second integration contract. At the same time, the work would have benefited from more clearly defining the form in which information is delivered to partner agencies, and to ensure that the requirements include the desired interfaces for the partners (due to their inability to separately pay for these enhancements).

The fourth issue, participation by operators in projects meetings, is still open. There is some concern that more effort is needed to make a smooth transition from design to operation, and that if the operators at OCTA are not more active in design, then the system will not be used.

As a final point, the project as proposed was intended to develop an innovative institutional framework for operation and maintenance. In actuality, the framework for

operation and maintenance is rather conventional, with a single lead agency (OCTA) assuming full responsibility. Other agencies participate as recipients of probe data. These agencies are only responsible for their own use of these data. The uniqueness comes from the participation and input of multiple agencies in developing project specifications. These comments are not intended to be critical of the approach. Rather, the approach taken seems to be a sensible way to manage a project of this type.

## **2.2 Institutional Issues and Barriers**

Interviewees were asked about the significance of each of the following institutional issues:

- Budgetary
- Training/Staffing
- Environmental Impacts
- Liability
- Intellectual Property Rights
- Privacy/Security
- Standards
- Regulations

The consensus is that most institutional issues do not present serious obstacles to the project. The only significant issues appear to be budgets and staffing/training. In particular, it is unclear how participating traffic agencies will staff the project, how interfaces and software will be developed and how OCTA will meet its eventual goal of installing GPS throughout its fleet. A related concern is that without adequate training at OCTA, dispatchers and bus drivers will not take full advantage of the system capabilities. There is also concern that the allocated budget will be insufficient to meet initial requirements. Some interviewees cited interface standards as a minor concern, including developing common standards for Showcase and developing statewide standards for dissemination of traveler information.

Whether or not institutional issues will become prominent remains to be seen. To date, however, the project has been smooth running and relatively free of contention of an institutional nature. The major issues have been technical and, to some degree, related to contract management (as discussed in 2.2).

## **2.3 Objectives**

Interviewees agreed that the *project* objectives are to:

- Develop a new means for analyzing roadway congestion, especially on arterials
- Develop new means for managing transit fleets

- Improve information for transit users
- Develop cooperative multi-modal relationships between transit and traffic agencies.

Multi-modal cooperation proved to be the most prominent project objective in most interviews; other objectives were viewed as more of a means toward achieving cooperation. All participants believe it is important to develop cooperative relationships between transit and traffic and that this project is a valuable first step or model toward developing a range of projects in the area of traveler information and transit management.

Agency objectives differ markedly from project objectives, especially with respect to congestion information. Apparently none of the participating traffic agencies has high expectations for buses as traffic probes. Participants are skeptical that probe data could be better than existing sources, that the contractor will develop adequate algorithms and that interfaces will be adequate.

Participants have much higher expectations that the project will produce valuable information for transit users and for transit managers. In fact, improving transit services is an important objective in and of itself to the participating cities -- Santa Ana, because it has the highest transit ridership in the county and Anaheim because of the large number of visitors. Transit is also important to Caltrans as an agency directive. Nevertheless, there is some worry that insufficient thought has been given to how the data will be integrated into dispatching operations and whether all of the elements will come together as an effective system.

Despite these comments, participants are relatively satisfied with the project and believe that it is meeting their objectives, if in a limited way. At the same time, the probe project is insignificant to some participants relative to other projects underway.

When asked as to probable effects of the project, participants felt it would have several positive, but minor, impacts. The biggest benefits would be in integrating transit/traffic functions and public knowledge of travel options (though the latter is more likely a function of TravelTip). Transit ridership and reliability would also likely improve. Participants are skeptical about benefits in air pollution, congestion and safety (though some thought passenger security would improve). Most felt that transit users would notice an improvement in service level but automobile drivers would not. These changes are more long-term and dependent on expanded deployment.

### **3. CONCLUSIONS**

To date, the probe project has proceeded in a fairly routine fashion, a clear accomplishment for a multi-agency project. This success can be attributed to clearly defining the lead agency (OCTA), and by the efforts of the lead agency to keep all

participants informed of progress and carefully manage contract schedules and deliverables. It can also be attributed to the maturity and adequacy of commercial tracking and communication technology.

The major question marks for the project center on whether the tracking data can be effectively integrated into existing traffic and transit systems, and whether deployment efforts can be funded. While largely a technical issue, the success will depend in part on whether contracts are written with sufficient precision to ensure that the system fulfills project objectives, and that the design effort is well integrated with system deployment.

#### **4. REFERENCES**

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Rockwell Transportation Systems (1996a). "Orange County Transportation Authority Transit Probe: Task 2 System Architecture and Conceptual Design."

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Transportation Corridor Consultants (1996). "Orange County Intelligent Transportation Systems Study Update," for Orange County ITS Management Team and Southern California ITS Priority Corridor Steering Committee.



## APPENDIX: INTERVIEW GUIDE

### Part A: Organization and Performance

- A1) What is the purpose of the project steering committee
- A2) What are some of the SC successes?
- A3) What are some of the SC shortcomings?
- A4) Have you had adequate opportunity to provide input to the project?  
[Rockwell: have you received adequate direction]
- A5) Is the SC addressing appropriate issues?
- A6) What have been the critical issues before the SC?
- A7) How were these issues resolved?
- A8) Can you suggest any changes in the organization or operation of the SC?
- A9) What is the relationship of this project to Priority Corridors and Showcase?  
Are there any ways to improve coordination?
- A10) What is the relationship of this project to SmartTraveler?  
Are there any ways to improve coordination?
- A11) Can you suggest any changes to the management or direction of the project?

### Part B. Institutional Issues and Barriers

In each of the following areas, describe the institutional issues facing the project. What is the significance of the issues, and what needs to be done about it?

Budgetary

Education/Staffing

Environmental Impacts

Liability

Patents

Privacy/Security

Standards

Regulatory Constraints

Other

### **Part C. Objectives**

C1) What are the objectives for the project?

C2) Is the project achieving these objectives?

C3) What are your agency's objectives for participating  
[Rockwell: what is your company's long-term objective]

C4) Is the project fulfilling your agency's objectives?

C5) How significant is this project relative to other activities of your agency?  
How has the project affected your agency?

C6) Do you expect that the project will be a model for future efforts? What is  
your vision for follow-on to the project?

C7) Over the last year, has your interest in the project increased, decreased or stayed the  
same (and why)? [skip for Rockwell]

C8) Do you believe that project will have a significant impact on the following  
situations?

State as positive, negative or no change; describe how significant and justify.

___ usage of public transit	_____
___ transit reliability	_____
___ congestion	_____
___ air pollution	_____
___ public knowledge of travel options	_____
___ safety or accidents	_____
___ inter-agency coordination	_____
___ other, please specify	_____

C9) Will transit users notice a difference in performance? What difference?

C10) Will drivers notice a difference in performance? What difference?

C11) Do you have any remaining concerns or comments?