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Development of User Needs and Functional Requirements for a Real-Time Ridesharing System

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**DEVELOPMENT OF USER NEEDS AND FUNCTIONAL REQUIREMENTS FOR A
REAL-TIME RIDESHARING SYSTEM**

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I EXECUTIVE SUMMARY:

Real-time rideshare matching is defined as a one-time match obtained for a one-way trip either the same day or the evening before. Possible benefits of developing a system to support real-time rideshare matching include allowing travelers to review rideshare options, identify best matching riders, reserve rides in advance, register details for an immediate travel request, and help in the formation of carpools taking real-time demand into account.

A real-time rideshare matching field operational test evaluation is being conducted in Sacramento, California with the participation of the Federal Transit Administration, Caltrans, **PATH**, Sacramento Rideshare, and U.C. Davis Institute of Transportation Studies. **As** part of the system design, user needs were assessed through a review of literature and focus group discussions. Two focus groups were conducted with Sacramento area commuters: one group (of 10 individuals) was composed of current and potential carpools, while a second contained solo drivers and those requesting carpool matches but as yet unmatched (9 individuals).

The literature review revealed that matching of traditional ridesharers is usually performed by computer, while the dissemination of information is accomplished almost exclusively via mail and telephone. **A** real-time rideshare system will contain many user interfaces for requesting a trip (including telephone, fax, computer, modem, and kiosk)

Casual, or “instant” carpooling, has emerged as a way of providing more flexible rideshare matching than is available in conventional ridesharing. In casual carpooling, carpools are formed on a voluntary, one-time basis, with no prior reservation or arrangement. This form of carpooling has proven to be effective for commuting on the San Francisco-Oakland Bay Bridge and the Washington D.C. area Shirley Highway, where **HOV** lanes allow carpools to save time and money.

The focus groups showed widely differing reactions to the concept of real-time ridesharing. The first group, composed of current carpools and potential carpools, generally reacted positively to the concept. The second group, composed of potential carpools and single-occupant drivers, expressed

serious doubts regarding the feasibility of real-time ridesharing, and felt that it was unrealistic, impractical, unresponsive to their needs, and even downright ridiculous.

Participants in the focus groups who were willing to consider real-time ridesharing required that all potential users of the system be screened with regard to criminal records, driving record, insurance status, and employment stability. Concerns were also raised regarding liability in case any untoward incident occurred. Participants were willing to supply required screening information, provided the information was not divulged to other participants or outsiders.

A fixed compensation scheme to prevent 'bartering or haggling' is strongly preferred. Suggested for this purpose was a fixed per mile charge with an inconvenience surcharge. Since this involves interaction only between users, no system function is required.

The telephone was the most preferred communications technology for accessing the system, while some preferred voice mail with key entry capability. Operator back up was a requirement for accessing the system.

Six user needs were identified from the focus groups and literature review: background screening; information security; matching and system reliability; system access; flexibility; and, a compensation scheme.

Functional requirements that the system must be capable of providing include checks of criminal records, driving records, insurance and employment status. Restricting access to personal information involves providing unique passwords and identification numbers for both users and operators.

The user need for a reliable system and high likelihood of finding a match for any given trip requires the system to be able to generate a large number of potential matches. This requires a large or concentrated participant pool, or very good matches to be provided by the system. Flexible ridesharing arrangements, that allow users with non-identical origins and destinations to be matched, would require drivers' routes to be recorded. These flexible pick-up

and drop-off arrangements will increase the likelihood of finding a rideshare match.

Allowing access to the system at all times, using a variety of interfaces, would require the system to be automated or at least partially automated. The system should be capable of accommodating telephone, fax, computer and modem access.

A high level of flexibility should be provided by the system. Users need the capability of specifying one-time trip information, and 'urgent' ridesharing that overlooks some matching preferences requires operator-assisted override of matching criteria.

The user needs and functional requirements derived from this study will be used to develop a set of hardware and software to be used in the operational test. It is clear that users were quite demanding of what they desire in terms of system functionality.

Some user needs, such as background screening of criminal and driving records may be costly, time consuming and possibly illegal. These issues will be resolved as the operational test evolves. What is clear is that users expressed strong opinions that the system provide some measure of security; thorough background checks seemed to be the most viable way to provide this functionality.

As with any other study, time limitations of the methodology must be kept in mind. User needs have been derived, largely through focus groups with 19 individuals. While this may seem highly risky, the research team believes little more would be learned prior to implementing and experimenting with a system. A thorough evaluation, targeting the expressed user needs and assessing user and non-user perceptions of how the system meets these needs, is required to validate the focus group findings and add to our understanding of the market for real-time ridesharing. It is clear that such a service faces significant challenges in the marketplace. The highest quality technology and design should be developed to help maximize the chances for system success.

II INTRODUCTION:

Ridesharing has long been perceived as a commuting mode which requires significant planning and lacks the flexibility associated with other commuting alternatives such as solo-driving. An efficient rideshare matching system is essential to promote ridesharing as a more effective commuting alternative [Dueker and Bair, 1977]. Potential carpoolers are first required to provide information such as names, phone numbers, home and work locations, and work start times. The rideshare agency matches their information with other participants registered in the database and identifies potential carpool partners. A matchlist including a list of all potential carpool partners, along with their names and telephone numbers, is mailed to the participant. The individual can then contact people on the list and form a carpool.

A real-time rideshare matching system could offer many benefits. It could allow travelers to review rideshare options, identify best matching riders, reserve rides in advance, register details for an immediate travel request, and help in the formation of carpools at park-and-ride lots while taking real-time demand into account. "Real-time" matching is defined as a one-time match obtained for a trip either the same day or the evening before. More importantly, a real-time matching system will make ridesharing possible for commuters who do not have a regular commute schedule in terms of departure time and origin or destination locations. Further, the most important breakthrough that Advanced Traveler Information Systems (ATIS) will bring to ridesharing, is that ridesharing information will ultimately be available in the vehicle. Therefore, the availability of a real-time rideshare matching system could significantly increase the market potential of ridesharing since the system would provide more options, and thereby increase rideshare opportunities.

Although real-time rideshare matching is not currently operational in the U.S., it is planned to be implemented as part of field tests of such systems in Houston, Texas, Sacramento, California and Bellevue, Washington [Labell, 1992]. Computer software is being developed to help automate rideshare matching services to be accessed via a variety of interfaces, including telephones, personal computers, and information kiosks, as part of the LA Smart Traveler and Houston Smart Commuter projects.

III OBJECTIVES OF THE REAL-TIME RIDESHARE MATCHING FIELD OPERATIONAL TEST EVALUATION:

The objectives of the Real-Time Rideshare Matching Field Operational Test Evaluation are to evaluate: system performance and efficiency, initial and operating costs, impacts on user behavior, user and non-user satisfaction, inducement of new rideshare users, and initial estimates of regional transportation impacts when the real-time rideshare matching system is fully deployed. Literature reviews, focus groups, system performance and participation level studies, and user and non-user surveys are being conducted as part of the evaluation efforts.

IV SCOPE OF REPORT:

This report documents the results of a user needs assessment conducted to define the concept of real-time ridesharing, and identify the problems that are to be addressed by the proposed Real-Time Rideshare Matching System. The user needs are then utilized to develop functional requirements for the real-time rideshare matching system. The functional requirements identify services that should be provided by the system, and the interfaces to be used to access the system.

V METHODOLOGY OF USER NEEDS STUDY:

User needs were assessed by conducting:

- i. A review of relevant literature to provide the conceptual and empirical basis for a real-time rideshare matching system.
- ii. Focus groups to elicit possible user responses to attributes of the proposed system, and help define functions the system must perform.

A summary of the findings of the literature review and focus groups is provided below.

V.1 Literature Review

The literature review provided an insight into the components of conventional rideshare matching systems comprising the ridematching service provider, system characteristics and functions, and user characteristics. In addition, rideshare program service characteristics that are required for the success of one-time, 'instant', rideshare matches were identified [Loo et. al., 1993].

The service provider usually consists of a ridesharing agency and transportation coordinators at the employer site. Rideshare agencies collect information from potential ridesharers, process the information, generate matches, and disseminate information to all interested parties. The agencies also evaluate the success of the rideshare matching functions and employ follow-up procedures to enhance the success of the program. The transportation coordinator gathers information on where employees live and their respective arrival and departure times. The coordinator may then determine possible matches for the employees and send them the information.

The functions performed by the rideshare matching system include information storage, processing, updating and validation, dissemination, and program evaluation.

Matching of ridesharers, an information processing function, may be performed either manually or by computer. Computerized matching can serve ridesharers more efficiently when the number of matches and data base is large, while manual matching works better when smaller participant pools exist and personalized attention is required. Updating and validation of information is periodically performed by rideshare agencies through mail surveys and telephone contacts. A 1990 survey of RIDES carpoolers revealed that matchlist information dissemination is predominantly done by several-day mail (52%), instantly by telephone (52%), and same-day mail (35%)' [Thayer, 1991]. Dissemination of rideshare information and communication among carpool partners has been conducted almost exclusively via mail and telephone. The standard measure of effectiveness of the ridesharing program is the percentage of commuters who successfully form a carpool as a result of receiving a matchlist from the agency.

User characteristics encompass a wide range of social and psychological factors. One study showed that men tended to carpool more than women, and that factors critical to ridesharing include time, cost, convenience, parking costs, carpool lanes, and the social dynamics of carpool formation [Morgan State University, 1984]. Participants of four 1991 focus groups conducted for the Texas Transportation Institute showed an affinity for ridesharing programs within separate corporations or subdivisions [Gelb, 1991]. The major economic factors that influence carpooling behavior include the trip length, costs of commuting, vehicle availability, trip destination, and the number of workers in the household. Public programs and ridesharing incentives also play a big role in inducing commuters to carpool. High occupancy vehicle (HOV) lanes and park-and-ride facilities are prominent facility requirements, while tax incentives and trip reduction ordinances are aspects of public programs users consider.

¹ Multiple responses permitted.

Real-time rideshare matching is not operational in the U.S.. However, some forms of ridesharing arrangements that incorporate particular aspects of the proposed real-time rideshare matching service have evolved. Casual carpooling, also known as “instant” carpooling, is a way of providing more flexible rideshare matching than is available through conventional ridesharing. Carpools are usually formed on a voluntary, one-time basis. No prior reservation or arrangement is made. Carpoolers gather at a specific location during certain periods of the day, and decide on the spot with whom to share a ride. Casual carpooling provides an effective means for commuting on the San Francisco-Oakland Bay Bridge and the Washington D.C. Shirley Highway where HOV lanes allow carpoolers to save time and money [Beroldo, 1990, Kihl, 1992]. In fact, some 2,500 commuters have been estimated to use this system on the Shirley Highway during the morning peak-period. No major incidents have been reported in either area [Turnbull, 1990]. However, in a series of four focus groups conducted for the Texas Transportation Institute, concerns of safety and security were raised about the ‘instant’ carpooling concept. Participants suggested that they would be far more likely to ask for a ride than give one, assuming that instant carpools are a ‘one-shot’ arrangement. The ‘instantness’ feature appealed to participants only in emergency situations [Gelb, 1991].

The conclusion of the literature review was that there is a substantial need for a thorough user needs assessment for real-time ridesharing. There exists no broadly available reference that defines the scope and functions required of such a system.

V.II Focus Group Results:

Two focus groups were conducted to obtain participants' reactions to the concept of real-time ridesharing. A market research firm, J.D. Franz Research, was contracted to recruit participants, make necessary arrangements and moderate the focus groups. Focus groups were conducted on April 27, 1993, on the premises of Research Unlimited, located in Sacramento. Participants in the first group included commuters who currently carpool, and those identified by Sacramento Rideshare to be awaiting carpool matches. The second group included people awaiting carpool matches, as well as people who drive alone who had not sought any information about carpooling. The results of the focus groups are fully documented in an accompanying report [Franz, 1993]. The screener used for recruitment of participants and the moderators' outline are provided as appendices to this report.

So that the potential for bias would be minimized, people who work in organizations concerned with transportation or air quality were excluded. A concerted effort was made to select commuters with varying commute distances and ages. Proper gender representation was an additional criterion used in the selection process. During the development of the focus group outline, a concern was raised about potential participants' willingness to real-time rideshare with those of other races. The potential seriousness and sensitivity of this issue was of primary concern to the research team. **As** researchers, we believe that it is important to identify the strength of feelings regarding ethnicity as they affect the potential market for real-time ridesharing. In order to begin to assess one aspect of this difficult issue, we formed one focus group of Caucasians only. This was not done to ignore the sensitivities of others, but was an attempt to assess the effect of ethnic biases on real-time ridesharing effectiveness. Had sufficient funds been available, a fuller set of focus groups would have been held with representation from other ethnic backgrounds.

While the primary purpose of the focus groups was to obtain participants' reactions to the concept of real-time ridesharing, information was also collected on commutes and commute modes, reactions to sharing rides with strangers, the information required about potential ridesharing partners, preferences regarding commute-cost sharing with respect to real-time ridesharing, and the relative attractiveness of possible real-time ridesharing technologies.

Reactions to the concept of real-time ridesharing in the first group were generally positive, although there were substantial concerns regarding personal security. Participants raised questions about the practicality and logistics of the concept, but seemed willing to give the concept a chance. The second groups' general reaction to real-time ridesharing, was that it was unrealistic, impractical, unresponsive to their needs, and in some peoples' view, downright ridiculous. Only three participants in Group 2 expressed any genuine interest in sharing rides, and only one of these was willing to give real-time ridesharing serious consideration.

Interested participants were of the opinion that all potential users of the real-time ridesharing system must be screened with regard to criminal records, driving record, insurance status, and employment stability. Several people pointed out that the screening process would constitute a major responsibility for the rideshare agency, raising concerns of liability in case of an accident or criminal act performed by a "screened" participant. The actual occupation was less important to participants than a stable employment history. Interested participants appeared willing to provide any information to the ridesharing agency that would be required for screening purposes. However, the confidentiality of participants' information would need to be protected, with only a "pass/fail" result being shared with potential partners. The information preferred about potential ridesharers included smoking habits/preferences, gender,

distances drivers would be willing to go out of their way, and in the case of longer commutes, hobbies and interests.

A fixed compensation schedule for the entire system, uniform across all users, was the unanimous choice of interested participants to prevent “bartering or bickering”. This would be a price per mile, with perhaps an inconvenience surcharge. A few dollars per trip seemed reasonable to all participants.

In both groups, the telephone was by far the preferred technology for accessing the real-time ridesharing system, while computers with modems were rejected because too few people had access to them. Some people preferred voice mail, while others preferred a human operator. One compromise suggested was voice mail with key entry capability, backed up by an operator.

Some possible benefits of real-time ridesharing included: fewer cars on the road; a fall-back when no other option is available; adaptability to flexible schedules; environmental benefits; cost savings in terms of gasoline and vehicle wear and tear; and, meeting new people providing security concerns can be addressed. The drawbacks identified include: possible unreliability of the system, the heavy logistical requirements of making a match, the hassle of making a match, safety (personal security and traffic safety), and possible inconvenience to other passengers in an existing carpool. Interestingly, the drawbacks are generally consistent with deficiencies in traditional rideshare matching systems.

VI USER NEEDS AND FUNCTIONAL REQUIREMENTS:

Based on the literature review and focus group results, a set of user needs for a real-time ridesharing matching system has been identified. A user need is a service that is

desired by a set of users. A functional requirement is defined as a set of tasks the rideshare matching system must perform in order to meet a user need. An information/technology requirement is simply the information or technology required to provide a system function. A total of six user needs have been identified, summarized in Table 1 along with the corresponding functional requirements and information/technology requirements.

VI.1 Background Screening:

Focus group members expressed concern for the safety of real-time ridesharing participants. It was suggested that a background screening check be conducted on each potential participant before admittance into the matching system. The rideshare matching agency would need to check potential participants' criminal record, driving record, and insurance status. Employment, specifically occupation and job tenure, would be verified in order to qualitatively measure an individual's 'stability'. A "pass" or "fail" rating would be given to each potential participant based on some predetermined scoring system; participants who pass would be included in the system; those who fail would be informed that they do not meet eligibility criteria.

Such a search could be performed either manually by a system operator or, if feasible, automatically by the system itself. Access to Department of Motor Vehicles (DMV), Department of Justice, and Department of Corrections databases would be necessary. Employment verification could be accomplished by calling the participant's employer. Insurance companies could verify automobile insurance status. The information required to complete these searches would be modest. Name, home and work telephone numbers, address, occupation, gender, social security number and drivers license number are probably all that would be needed.

TABLE 1: SUMMARY OF REAL-TIME RIDESHARING USER NEEDS, FUNCTIONAL REQUIREMENTS AND INFORMATION/TECHNOLOGY REQUIREMENTS

<u>USER NEEDS</u>	<u>FUNCTIONAL REQUIREMENTS</u>	<u>INFO/TECH REQUIREMENTS</u>
<i>BACKGROUND SCREENING</i>	<ul style="list-style-type: none"> Check criminal record Check driving record Check insurance status Verify employment 	<p>Computer/manual search of DMV, Dept. of Justice, and Dept. of Corrections data bases. Employment verification by calling participant at work phone, use of Social Security #, insurance check by calling insurance company</p>
<i>INFORMATION SECURITY</i>	<ul style="list-style-type: none"> 1. Safeguard personal info. from unauthorized user access (once in system, person has passed) 2. Restricted access by system operator (selected people only) 	<ul style="list-style-type: none"> 1. System provided access identification code for users 2. Access password for operators
<i>MATCHING / RELIABILITY</i>		
a Registration, high likelihood of matching	a Ability to generate potential matches	a Name, Occupation, Gender, Home & Work Phone #, Social Security #, Drivers License #, Work time flexibility, O-D, work hours, smoking preference, amt. of time/distance inconvenience allowed, address, nearest intersection, office address
b. Flexible pick-up and drop-off	b. Allow matches for non-identical origins and destinations	b. Geocoding of driver route and rider O-D
c. Communication between ridersharers	c. Information dissemination to both parties	c. Phone #, Origin-Destination (O-D), personal messages
d. Meeting as scheduled	d. Backup for No-show e.g. Guaranteed Ride Home program	d. Feedback to system on missed rides

TABLE 1 (Continued)

USER NEEDS

**FUNCTIONAL
REQUIREMENTS**

INFO/TECH REQUIREMENTS

SYSTEM ACCESS

Provide matching services at any time of day

User interfaces
telephones, fax machines, computer
terminals, kiosk
Various User Interfaces to Access system
integrated rideshare matching system

FLEXIBILITY

a. Allow users to vary O-D, route
and ~~time~~ drive/ride preferences

a. Accomodate one-time trip information

a. System provides user with options to
vary trip description

b. Allow "urgent" ridesharing

b. Operator override of usual preferences
or matching criteria

b. System must allow operator to alter
criteria used for matching

COMPENSATION SCHEME

-Uniform Compensation schedule

Ability to generate cost of match.

Cost estimation including cost/mile, geocoded
O-D, initial and suggested route.

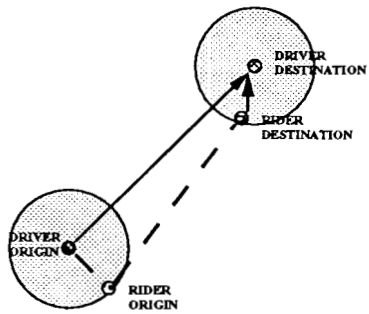
V1.2 Information Security:

Information security seemed to be a significant concern of focus group participants. In order to safeguard personal information from unauthorized users, access to the system would be restricted by individualized user and system operator passwords. Further, only essential information on participants would be stored in the system. A 'pass' or 'fail' rating would be substituted for driving, criminal, and various other records.

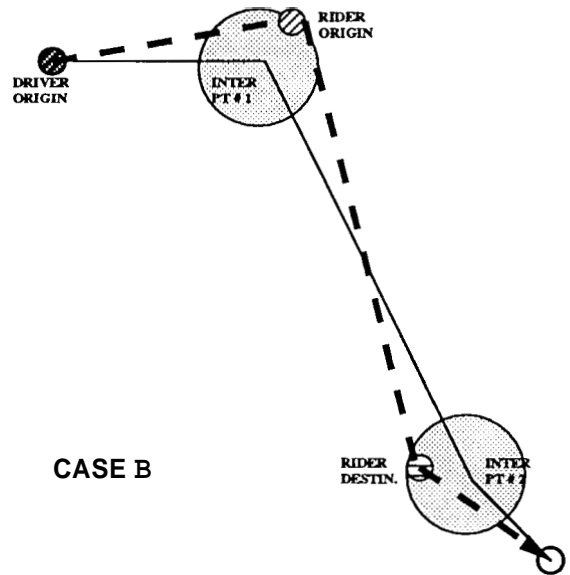
V1.3 Matching/Reliability:

Users of a real-time ridesharing system would certainly demand system reliability. They would demand a high likelihood of finding a match for any given trip. This requires the system to be able to generate a large number of potential matches, or a smaller number of good matches for each potential ridesharer. This, in turn, would require, among other things, a significant or concentrated pool of users. Information required for matching includes: name, home and work address, occupation, gender, home and work phone, work time flexibility, usual work origin and destination, work hours, smoking preference, maximum allowable time or distance pick-up and drop-off inconvenience, and overall preference for riding or driving. Information such as hobbies and interests, or radio station preference might be necessary for matching longer distance commuters.

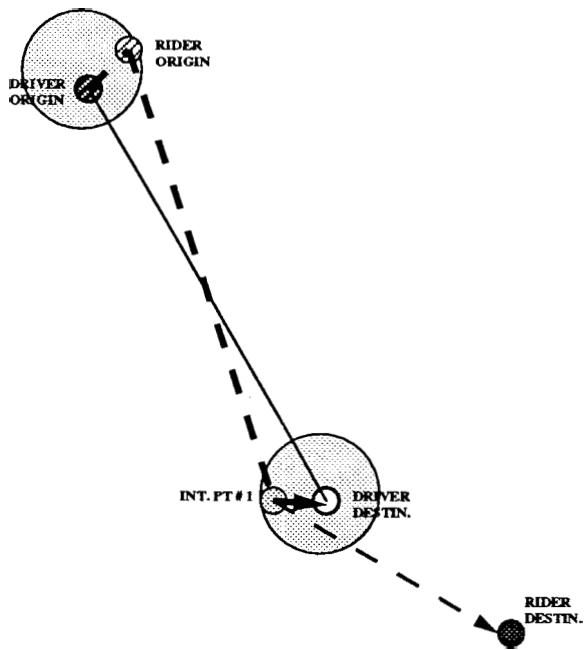
In order to increase potential matches, flexible pick-up and drop-off locations can be used. This would allow for matches between users who have non-identical origins and/or destinations. This feature would require driver route information and a geocoded system to store and process such information. Such a system could identify a rider whose origin and destination is on the driver's route. Figure 1 illustrates four possible pick-up/drop-off scenarios which could occur.



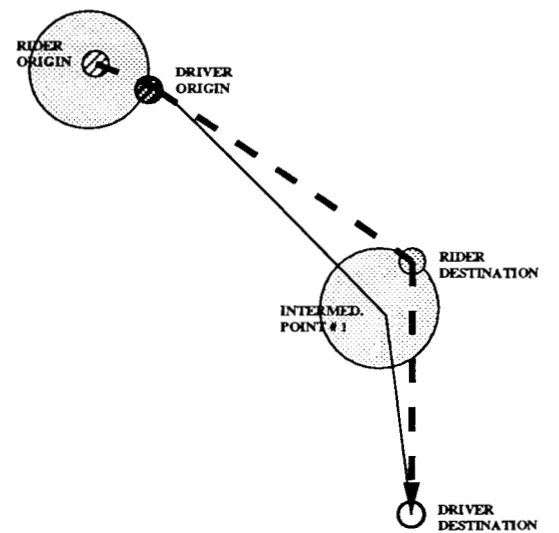
CASE A



CASE B



CASE C



CASE D

FIGURE 1 : Schematic of Possible Rider and Driver Origins and Destinations

Case **A** is the circumstance in which driver and rider have similar origins and destinations. Case **B** occurs when the driver has origin and destination beyond the rider's origin and destination. The driver must divert somewhat (maximum allowable pick-up inconvenience) to both pick up and drop off the rider. The driver then continues to a destination. Cases **C** and **D** are special cases of **B** where either the origin or destination are similar but the other is not. Discussions with California rideshare agencies indicate that Case **A** is routinely the basis for match lists for traditional ridesharing but special searches are made for difficult matches (Cases **B-D**). These special searches consume time and resources and are only conducted when the normal search fails to find successful matches. Given the nature of the likely market for real-time ridesharing, it is highly advisable that the real-time rideshare matching algorithm routinely and automatically search for matches for Cases **A-D**.

Once a substantial number of potential matches are identified for a particular user, pertinent information (home and work phone numbers) must be provided to contact and arrange matches with prospective ridesharers. This requires the system to be capable of providing information to users on a real-time, on-line basis. It is then up to ridesharers to arrange a pick-up time and location and to meet as scheduled. A guaranteed ride home program (taxi ride reimbursement) can provide backup for driver who do not show up. All missed rides should be recorded in the system so that appropriate action may be taken.

V1.4 System Access:

Users of a real-time ridesharing system will certainly demand a high level of access to the ridesharing system. This level of access has two components. First, the system must be accessible at any time of the day. Second, the system must be accessible by

several different user interfaces. Telephones, fax machines, and computer terminals should all be able to access the system.

V1.5 Flexibility:

Such a system must also offer users a high level of flexibility. To accommodate one-time trips, users must be allowed to vary work hours, origins, destinations, route choice, and drive/ride preference when calling up the system. Therefore, the system must have a built-in option to allow users to vary trips. The system must also allow for 'urgent' ridesharing. This term is used to describe users who need a ride and are willing to overlook some matching incompatibilities. This requires an operator to override the usual matching criteria in order to find such a user a match.

V1.6 Compensation Scheme:

Focus group participants recommended a fixed compensation schedule to prevent "bartering or bickering". A per mile charge and inconvenience surcharge were proposed. It would be useful if an estimated cost for the requested trip is included to provide basic cost information to the rider prior to initiating the trip.

VII CONCLUSIONS AND RECOMMENDATIONS:

Real-time rideshare matching is defined as a one-time match obtained for a one-way trip either the same day or the evening before. Possible benefits of developing a system to support real-time rideshare matching include allowing travelers to review rideshare options, identify best matching riders, reserve rides in advance, register

details for an immediate travel request, and help in the formation of carpools taking real-time demand into account.

A real-time rideshare matching field operational test evaluation is being conducted in Sacramento, California with the participation of the Federal Transit Administration, Caltrans, PATH, Sacramento Rideshare, and U.C. Davis Institute of Transportation Studies. As part of the system design, user needs were assessed through a review of literature and focus group discussions. Two focus groups were conducted with Sacramento area commuters: one group (of 10 individuals) was composed of current and potential carpoolers, while a second contained solo drivers and those requesting carpool matches but as yet unmatched (9 individuals).

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carpoolers and single-occupant drivers, expressed serious doubts regarding the feasibility of real-time ridesharing, and felt that it was unrealistic, impractical, unresponsive to their needs, and even downright ridiculous.

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A fixed compensation scheme to prevent 'bartering or haggling' is strongly preferred. Suggested for this purpose was a fixed per mile charge with an inconvenience surcharge. Since this involves interaction only between users, no system function is required.

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Functional requirements that the system must be capable of providing include checks of criminal records, driving records, insurance and employment status. Restricting access to personal information involves providing unique passwords and identification numbers for both users and operators.

The user need for a reliable system and high likelihood of finding a match for any given trip requires the system to be able to generate a large number of potential matches. This requires a large participant pool, or very good matches to be provided by the system. Flexible ridesharing arrangements, that allow users with non-identical origins and destinations to be matched, would require drivers' routes to be recorded. These flexible pick-up and drop-off arrangements will increase the likelihood of finding a rideshare match.

Allowing access to the system at all times, using a variety of interfaces, would require the system to be automated or at least partially automated. The system should be capable of accommodating telephone, fax, computer and modem access.

A high level of flexibility should be provided by the system. Users need the capability of specifying one-time trip information, and 'urgent' ridesharing that overlooks some matching preferences requires operator-assisted override of matching criteria.

The user needs and functional requirements derived from this study will be used to develop a set of hardware and software to be used in the operational test. It is clear that users were quite demanding of what they desire in terms of system functionality.

Some user needs, such as background screening of criminal and driving records may be costly, time consuming and possibly illegal. These issues will be resolved as the operational test evolves. What is clear is that users expressed strong opinions that the system provide some measure of security; thorough background checks seemed to be the most viable way to provide this functionality.

As with any other study, time limitations of the methodology must be kept in mind. User needs have been derived, largely through focus groups with 19 individuals. While this

may seem highly risky, the research team believes little more would be learned prior to implementing and experimenting with a system. A thorough evaluation, targeting the expressed user needs and assessing user and non-user perceptions of how the system meets these needs, is required to validate the focus group findings and add to our understanding of the market for real-time ridesharing. It is clear that such a service faces significant challenges in the marketplace. The highest quality technology and design should be developed to help maximize the chances for system success.

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APPENDIX A
SCREENING QUESTIONNAIRE

COMMUTING STUDY

FOCUS GROUP SCREENER

GROUP I: CARPOOLERS - RECRUIT 1/2
THOSE AWAITING CARPOOL MATCH - RECRUIT 1/2

GROUP II: SOLO COMMUTERS (DRIVE ALONE) - RECRUIT 1/2
THOSE AWAITING CARPOOL MATCH - RECRUIT 1/2

USE STANDARD INTRODUCTION.

1. RECORD GENDER

- MALE - RECRUIT 1/2
- FEMALE - RECRUIT 1/2

2. First, do you or does anyone in your household work in advertising, marketing research, or public relations?

YES - TERMINATE NO - CONTINUE

3. And do you or does anyone in your household work for the California Department of Transportation, the California Energy Commission, the California Environmental Protection Agency, or any other organization that deals with transportation or air quality?

YES - TERMINATE NO - CONTINUE

4. Have you ever participated in a focus group?

YES: When did you last participate in one? _____
TERMINATE **IF** PAST YEAR.

And have you ever participated in a focus group having to **do** with transportation, air quality, or commuting to work?

YES - TERMINATE
NO - CONTINUE

NO : CONTINUE

5. Do you usually commute to work between 6 and 10 a.m. and commute home between 3 and 6 p.m. at least four days a week?

YES - CONTINUE NO - TERMINATE

6. **And** how do you usually commute?

- DRIVE ALONE - CONTINUE
- CARPOOL OR VANPOOL - GROUP I ONLY - SKIP TO Q #9
- TRANSIT - TERMINATE
- OTHER - TERMINATE

IF DRIVE ALONE:

7. Have you ever expressed any interest in joining a carpool or vanpool?

YES - CONTINUE
NO - SKIP TO Q #10 - GROUP II ONLY

IF EXPRESSED INTEREST IN CARPOOLING/VANPOOLING:

8. Are you currently waiting for a carpool or vanpool match?

YES - GROUP I OR GROUP II
NO - GROUP II ONLY

SKIP TO Q #10

IF CARPOOL:

9. Do you carpool or vanpool with **members** of your household, with people outside your household, or with both?

- HOUSEHOLD - TERMINATE
- OUTSIDE - CONTINUE
- BOTH - CONTINUE

10. About how long is your commute?

- LESS THAN 10 MILES)
- 10 - 25 MILES) RECRUIT A MIX
- OVER 25 MILES)

11. **What** was the last grade in school that you completed?

- LESS THAN HIGH SCHOOL)
- HIGH SCHOOL GRADUATE)
- SOME COLLEGE/TECHNICAL TRAINING)) RECRUIT A MIX
- SOME COLLEGE
- COLLEGE GRADUATE)
- GRADUATE WORK)

12. And what is your age, please?

- | | | | |
|--------------------------|-------|---|---------------|
| <input type="checkbox"/> | 18-24 |) | |
| <input type="checkbox"/> | 25-34 |) | |
| <input type="checkbox"/> | 35-44 |) | RECRUIT A MIX |
| <input type="checkbox"/> | 45-54 |) | |
| <input type="checkbox"/> | 55-64 |) | |
| <input type="checkbox"/> | 65+ |) | |

13. What is your occupation? _____

14. And where do you work? _____
(MAKE SURE THIS IS NOT ANY KIND OF EXCLUDED ORGANIZATION.)

USE STANDARD INVITATION AND CONCLUSION.

NAME : _____

ADDRESS : _____

CITY: _____ ZIP: _____

PHONE: HOME: _____ WORK : _____

APPENDIX B
MODERATOR'S OUTLINE

UNIVERSITY OF CALIFORNIA AT DAVIS
INSTITUTE OF TRANSPORTATION STUDIES
FOCUS GROUPS ON REAL-TIME RIDESHARING

Introductions

Introduce Self

Company
Moderator - Lead Discussion
No Interest in Outcome

Introduce Topic

Tonight Talk about Commuting
Details Soon - First Get to **Know** You & Talk about
Tonight's Process

Group Introductions

Name (First Only)
Where Live and Where Work (Geography, Not Company)
One Thing Like Everyone **to Know** about Self

Ground Rules

Refreshments (Dinner, Snack, Drinks)
One-way Mirror - Colleagues
Audiotaping

Can't Focus and Take Notes
Sure **Know** What Said
Speak Up and Distinctly
No Talking at Same Time
Tape Doesn't Understand (Nod, Shake Head)

Everyone Needs to Participate - Every View Important
Also **OK Not** to **Be** Certain About Some Things Talking About - Not
Test **of** Knowledge, Just Want Opinions
May Ask to Cut Short **so** Others Can Talk - Part **of** Process,
Don't Take Personally
May Well Disagree - Most Groups **Do** - Jump in if Another Opinion
- More Interesting
Questions about the Rules?

Commute Patterns

Tell us about commutes

How far?
How long?
How commute?

Tried other ways? What? How felt?

How feel about commute?

(Some carpool/carpooled) - Rest of you?

Ever carpooled?
Thought about carpooling?
How feel about carpooling?

If carpool - role?

Driver only
Rider only
Alternate
Don't Care

Why?

How feel about carpooling with people don't know? (OPEN)

PROBES:

Would reason make **a** difference?
Would time **of** day make **a** difference?
Would location make a difference?

Would it help to meet in advance?

How many times?

Would it help to have information about person?

What information?

PROBES:

Occupation
Education
Income
Gender
Age
Ethnicity
Interests/Hobbies
Smoker/Non-smoker
Driving Record

What of this information would you be willing to provide to possible carpool partners?
(REPEAT AS NEEDED)

What like to talk about now is new concept called "real-time ridesharing" - let me describe a little ...

Most carpools and vanpools now operate on regular basis - people participate at fixed times and places every day of week, or at least most days. In real-time ridesharing, people who want **or** need a ride can contact ridesharing agency and get list of people who meet immediate need (such as time, location) with less than 24-hours notice - same day or day before. Person can then either arrange to carpool with someone on list or request automatic matching from ridesharing agency.

What think about this idea? (OPEN)

PROBES:

What would be advantages?

PROBES:

Convenient?
Flexible?
Easy to find match?
Time-saving?

What would be disadvantages? (OPEN)

PROBES:

Riding with strangers
Uncertainty of finding partner

How safe feel this would **be**?

How feel about making own match versus automatic matching?
(OPEN)

PROBE: Time savings versus no contact?

How would costs be shared?

PROBE: Pay transit fare for distance?
Miles times **33** cents/number in car?

Objections to uniform pre-arranged system?

Who would use/benefit?

PROBES - Some people have suggested:

People who don't commute on regular basis (days)
People who don't commute regular schedule
Carpool - need to leave early
Carpool - need to stay late
Emergency situations - cheaper than taxi

Now let's talk about technology involved ...

Four possibilities: touchtone phone (regular, cellular/car)
fax
computer with modem
cable television

Phone - Call in, get list or match

How easy feel this would be for you?
Prefer automated system or operator?

Drivers - even possible to get request on car phone, re-route
to pick someone up

How many have car phones?
Willing to do this?
How easy feel this would be for you?
How feel about cost?

Fax - Fax request in, get fax back

How many have access to fax machine?
How easy feel this would be for you?
How feel about cost?
How important having hard copy?

Computer - Dial into rideshare agency using modem, information
sent back to computer

How many have access to technology?
How easy feel this would be for you?
How feel about cost?
How important having hard copy potential?

Cable - Specified channel, provides information and directions

How many have cable?
How easy feel this would be for you?
How feel about cost?

Of all four options, which one prefer? Why?

Considering everything we've discussed this evening, how likely use real-time ridesharing if available?

Why?/Why not?

People more inclined to carpool if real-time ridesharing available?

Why?/Why not?

You more inclined to carpool if real-time ridesharing available?

Why?/Why not?