Final Focus Group Report.

Traveler Behavior

FAST-TRAC
Phase III Deliverable

#16A. Final Focus Groups Report

EECS - ITS LAB - FT97 - 001

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INTRODUCTION

The FAST-TRAC (Faster and Safer Travel through Traffic Routing and Advanced Controls) Operational Field Test (OFT) is an Intelligent Transportation Systems (ITS) project being conducted in Southeast Michigan, largely within Oakland County. The project involves the deployment and testing of both an Advanced Traffic Management System (ATMS) and an Advanced Traveler Information System (ATIS). The ATMS includes over 200 computer controlled traffic signals (SCATS) and new video image processing technology for vehicle detection (Autoscope). The ATIS is Ah-Scout route guidance which provides turn-by-turn directions to a destination selected by the driver. Guidance is communicated to the vehicle via roadside beacons that use infrared radiation to communicate with the vehicles. The directions seek to produce the fastest route from Point A to Point B. FAST-TRAC project sponsors include: The Road Commission for Oakland County, the Michigan Department of Transportation, and the Federal Highway Administration. Other partners and participants include: Siemens Corporation, Rockwell International, AWA Traffic Systems America Inc., Chrysler Corporation, Ford Motor Company, General Motors Corporation, Nissan City of Troy, Michigan State University, and the University of Michigan.

The entire test is being evaluated by a team led by the University of Michigan. Evaluation components include traffic analysis, human factors, simulation and modeling, as well as traveler behavior. As part of the traveler behavior evaluation of FAST-TRAC, subjects were recruited to test drive vehicles equipped with the Ali-Scout route guidance system. For the purpose of this study, each subject possessed an equipped vehicle for four weeks, during which time the vehicles were used for the majority of subjects' trips. In this way, participants were able to experience route guidance "naturally;" they did not use simulators or merely engage in a single test drive. These subjects were required to keep driver logs and fill out user surveys. In addition, these subjects were invited to participate in a series of focus groups held to discuss their experiences. The focus groups are the subject of this report.

State of the System

A key aspect of this evaluation was the state of the system at the time that subjects experienced Ali-Scout route guidance. Participants in the focus groups experienced the system under ever improving conditions. Beacons, which provide the communications from the Traffic Operations Center to the vehicles, were not fully installed at the beginning of subjects' experiences, nor did those which were installed always function. In January 1996, about 80 of the 100 planned beacons were operational. Routing databases themselves underwent continual improvement as the system was fine tuned. Subjects who participated in the focus groups had experience with the system sometime between October 1995 and April 1996.

Another key variation of the system was static vs. dynamic guidance. Static guidance provides routes based on static link times assuming no congestion. In contrast, dynamic guidance calculates routes with historical congestion patterns that vary with time of day and day of the week. While the Ali-Scout system changed from static to dynamic mode on May 1, 1996, all of the focus group participants experienced static guidance prior to that time. Because of that, the focus groups provide evaluation data based solely on participants' experience with static route guidance and should not be used to assess their response to a dynamic system

There is no way to filter out the effect of ongoing deployment and system improvements on the focus group data, except to say that system inaccuracies decreased over time as the system reached fuller geographical and functional deployment. Overall, the improvements exposed the participants to some benefits as well as problems associated with route guidance. It is important to note that most of the focus group participants expressed frustration with the system's inaccuracies. The level of frustration may be related to the fact that most participants were

also extremely familiar with the driving area, possibly making inaccuracies more noticeable and irritating to the driver.

The following map shows the location of the test in Southeast Michigan, with the dots representing beacon locations. Beacons ate located predominantly at major intersections, and at key locations on freeways.

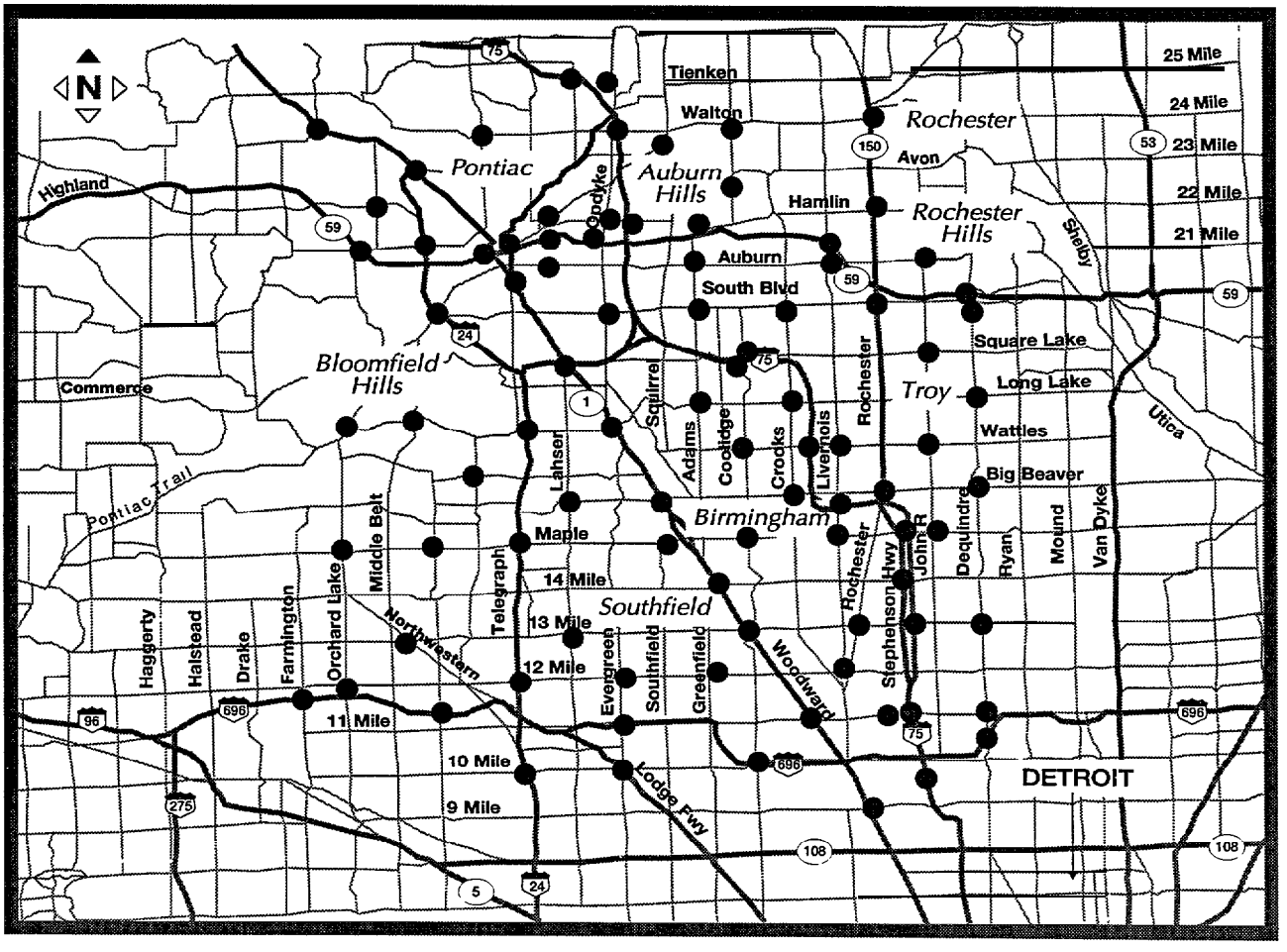
Focus Groups as a Research Tool

Focus groups are a mainstay of market research and have been extensively used in marketing since World War II. Traditionally, market researchers use focus groups to examine people's responses to a product, and are hired by the company that makes the product. In the case of FAST-TRAC, there is no client in the traditional sense, and an important aspect of an OFT is that these tests are evaluated by an independent organization.

What is a focus group and why is it useful?

As a qualitative research method, the focus group emphasizes depth and detail that does not easily emerge from a quantitative study. ***As David Morgan writes in Focus Groups as Qualitative Research:***

> Focus groups are basically interviews, although not in the sense of an alternation between the researcher's questions and the research participants' responses. Instead, the reliance is on interaction within the group, based on topics that are supplied by the researcher, who typically takes the role of a moderator. The fundamental data that focus groups produce are transcripts of the group discussions (Morgan, 1988).



Oakland County Beacon Location Map

Sampling for focus groups is much different from survey sampling. Because focus groups are based on homogenous populations, the objective is to describe a particular subgroup in detail. As Morgan writes, "in selecting participants, the issue is sample bias, not generalizability: 40 or so participants are never going to be representative of a large population (Morgan, 1998)." Sample bias is an issue with focus groups because participants are selected systematically, not randomly. For example, all the participants in the Ali-Scout focus groups came from a limited source-people involved in the Ali-Scout Natural Use Study. But sample bias only becomes a research issue if you generalize focus group data; that is, if you report that what is said in the focus group is representative of a population beyond those who participated. With this study, the objective was to describe in detail the perceptions of people who experienced Ali-Scout from the pool of people who were provided experience with Ali-Scout.

Although a great deal has been written on the design and function of focus groups, because of its marketing history much of the literature fails to provide guidance for focus groups as social science research. More recent literature has attempted to do so. According to one source, "the key to using focus groups successfully in social science research is assuring that their use is consistent with the objectives and purpose of the research (Stewart & Shamdasani, 1990)." So what is the difference between focus groups and other social science research tools? The answer lies in the type of data collected. As the definition above states, focus groups are intended to mimic natural conversation among a group of homogenous individuals about a single topic. The idea is that such a conversation better reflects people's reality; "focus groups am useful when it comes to investigating ***what*** participants think, but they excel at uncovering ***why*** participants think as they do (Morgan, 1988)." The facilitator is responsible for guiding the group, and ensuring that the necessary research questions are answered and discussed, but the method allows group dynamics to focus discussion on those topics most important to the participants, not the facilitator.

METHODOLOGY

Research Approach and Objectives

In FAST-TRAC, the purpose of the focus group research was to explore people's responses to Ali-Scout route guidance, and, by extension, the concept of route guidance in general. Although participants' experience with route guidance was limited to a single implementation, it was hoped that they could extrapolate to a more general discussion of route guidance that could further guide development of traveler information services. It is especially difficult to get good consumer response data with new technology because people have nothing with which to compare their experience. Participants were therefore given experience with Ali-Scout in their daily lives through the use of a test vehicle over a four week period.

The focus groups were designed to be self-contained, as "the results of the research can stand on their own...no further data collection is necessary before reporting the results from the focus group research itself (Morgan, 1988)." This does not mean that such research cannot be part of an overall project; on the contrary, focus group results can be used to triangulate (taking multiple angles of perspective on the data) with different forms of data collection, like surveys. The focus group results can be compared to other results as part of the process of result verification. See Phase III Deliverables #6 &#7 (Stakeholder Analysis), #15A (Ali-Scout Natural Use Study), and #16B (Choice Modeling) for different ways in which information on users was collected and the corresponding results.

An important task to accomplish before holding focus groups is to determine research objectives. What research questions are you attempting to answer through the use of focus groups? With this study, although the subjects' experience was Iimited to a specific route guidance system, Ali-Scout, the evaluators did not wish to limit the research objectives to an assessment of this specific approach to route guidance. The following are the objectives on which the focus groups were based:

1. Identify responses to the system that could not be anticipated for inclusion in the questionnaire design.
2. Gather and analyze qualitative data describing people's responses to Ali-Scout, as stand-alone data and as verification with other evaluation results.
3. Identify perceptions of route guidance in general, given that it is a new and innovative technology, and apart from a specific implementation.

While it is crucial to have well-defined objectives before holding focus groups, the research was guided by a non-hypothesis based approach known as Grounded Theory (Charmaz, 1983). Grounded Theory "stresses discovery and theory development rather than logical deductive reasoning which relies on prior theoretical frameworks." This means that "both the processes and products of research are shaped from the data rather than from preconceived logically deduced theoretical frameworks" (Charmaz, 1983). Hypotheses for how individuals might react to Ali-Scout were not developed, nor were questions considered that would prove or disprove such theories. Rather an interview guide (Appendix A) based on the above stated objectives was developed. With data analysis, the participants' statements reveal their experiences and the actual text is from where the theories and themes are derived. The meaning of the data is found in the words of the participants themselves, with the transcriptions being the starting point of the analysis.

Study Characteristics

As stated in the introduction, the focus group study was part of a larger Ali-Scout Natural Use Study. For this study, subjects received Ali-Scout equipped vehicles which they used as they would their own for four weeks. They completed surveys and driver logs during those four weeks. Twelve four week cycles comprised that study and data collection was completed at the end of October 1996, with

approximately 120 people participating. Focus group participants were from a pool of approximately 65 individuals from the first six cycles (October 1995-April 1996). All subjects were invited to participate in a focus group and twenty-six people participated (40% of the pool) in one of five focus groups. Four groups were held in February 1996 and a fifth group was conducted in May 1996. Participants were not paid for their participation because possession of the test vehicle was viewed as sufficient compensation.

Each focus group was held at a professional market research facility, with a climate controlled environment, quality audio recording equipment, comfortable seating, and an oblong table so all participants could see each other. Focus groups can vary in size from three to twelve people each. Group dynamics change with each additional person; generally with fewer participants, each person has greater opportunity to speak while in larger groups the number of ideas generated is greater. The FAST-TRAC focus groups averaged five people each, emphasizing greater opportunity for participants to speak.

Although an interview guide was used by the facilitator during the focus groups, the overall structure did not require strict adherence to each question, nor did it preclude the addition of probe questions in response to the content of the discussion. This allowed the facilitator to pursue interesting topics as they arose without being constrained by a rigid question/answer format. The preferred dynamic was for the facilitator to introduce a question and then let the participants discuss the issue amongst themselves. In this way, the issues that are more relevant to the participants are discussed and they are able to build on what each other said, allowing the discussion to proceed according to the group's logic, not the facilitator's. The facilitator retains the ability to ask the necessary set of questions over the course of the focus group. The facilitator introduces new areas of inquiry, but often times participants arrive at those issues on their own, through the natural course of conversation.

Subject Demographics

All Ali-Scout Natural Use Study subjects, which includes the focus group participants, were recruited at Michigan Secretary of State offices, Oakland University, and Beaumont Hospital. Criteria for selection included: age, gender, driving record, 50% or more driving in the beaconed area, live or work in the beaconed area, amount of driving, interest, and perceived reliability. There are three characteristics of subjects particularly relevant to the focus groups. They are: gender, age, and timing of experience. There are three age groups, chosen for two reasons. First, the Ali-Scout Natural Use Study design limited the number to three. Second, the breakdown was based on safety information; Accident rates for those younger than 30 and over 64 are significantly higher than those in between. For that large middle group, the number of crashes is fairly constant.

With respect to the timing of participants' experience, the system was being improved over the period of the test, and dynamic guidance was not turned on until May 1, 1996, after all of the focus group participants had returned their test vehicles. Table 1 shows the breakdown of these three attributes among the twenty-six focus group participants:

Table 1: Subject Characteristics

	Number	Percent
GENDER		
Women	13	50%
Men	13	50%
AGE		
19-29	6	23%
30-64	14	54%
65-80	6	23%
TIMING OF EXPERIENCE		
10/15/95-I/15/96	14	54%
l/17/96-4/17/96	12	46%

In terms of each group's composition, the participants were mixed for each characteristic (i.e., no effort was made to hold groups for women only, for those over 65, etc.). For more information on subject demographics, refer to Phase III Deliverable #15A, Ah-Scout Natural Use Study.

DATA ANALYSIS

Transcriptions of each focus group were made, for a total of eighty-seven pages. The researcher reviewed each transcription several times, making handwritten notations in the margins, as ideas emerged along the way. Meaningful statements made by the participants were underlined and then re-entered into a separate document of quotes from the transcriptions. This process is termed coding, during which the text itself is used to build the analysis. Once the codes, or quotes, are listed, they are printed off and cut into strips. These strips are then organized by the idea they each contain, building to categories, which represent major issues occurring in the data set (Appendix B). With categorization, common themes emerged among the different groups. For example, there might be a group of quotes with the following statements:

> "It would be really nice if some time in the future it was country wide."
>
> "I think you need more beacons for it to work properly."
>
> "Maybe with more beacons it would be a more effective program."
>
> "Pay for something that's going to take you all over the place."

What these statements have in common is the idea that more beacons in a wider area are desirable. The category is named insufficient beacons/wider area and is related to a broader theme of area familiarity.

In addition to the analysis of the transcriptions, notes were taken by an assistant who was observing each focus group session behind a one-way mirror. The purpose of these notes is to record ideas, thoughts, and connections made between issues, while data collection is occurring. They encapsulate impressions of the group, touch on how the discussion went, what some of the main issues were, any new questions that arose, and ideas on new ways to ask questions. These notes help the researcher remember the details of the group that cannot be found in the transcripts themselves; they also serve as a validation check on the coding and categorization. If there appears to be a gap between observation notes and analysis results, transcriptions are reviewed again, and a third party may be brought in to examine the transcriptions. In this case, the observations and transcription results were comparable.

The results of the entire coding, categorization, and theming process are discussed below. The major themes that emerged include Accuracy and Area Familiarity. Minor themes include: Benefits Distrac-

tion, Insufficient Warning, and Who Pays? Whether an issue was a major or minor theme depended quite literally on the volume of comments that related to that category. Minor themes also showed less consensus among participants than the major themes showed. Following the discussion of themes is a section on participants' responses to the concept of route guidance, including their suggestions for improvements and a definition of Ideal Route Guidance.

Major Themes

Accuracy

These focus groups were largely defined by the participants' experience that Ali-Scout was inaccurate. Participants saw that a main function of the system to get people correctly from Point A to Point B, did not work. The fact that the system was sometimes accurate was especially frustrating to participants because they could therefore not depend on the system. As one person stated, "if you didn't know where you were going, you would never have made it." This perception stemmed from several problems.

First, people experienced inconsistencies with guidance; people would receive good guidance one day and bad guidance the next, for the same destination. "I could be within five houses, that's how accurate it would be sometimes. But sometimes it would be five houses this direction, sometimes five or six houses on the other side and I couldn't understand why it drifted like that." Another person said "I programmed my Ali-Scout to the same parking space for every day and I don't understand why on some days it would tell me I still have this many miles to go and on other days it would tell me I had reached my destination." More dramatically, one individual told the following story:

> There was one route in particular that it would be confused on...for some reason, instead of taking me back to Troy, it took me out to Scott Lake Road in Waterford Township about eighteen miles away and then went in autonomous mode...the mileage still showed I was eighteen miles off, it just took me someplace completely different. I couldn't figure out why...I followed it just for curiosity just to see where it would go. Then it went to autonomous mode and okay, it thinks I'm home now. I gave up and went back home. I tried to use it as often as I could just for that, just for almost entertainment factor to see where it would go.

Participants followed the guidance just to see where it would take them. They received circuitous directions ("one time it just kept telling me to go in circles, 'turn left,' I'd turn left, 'turn left,' I'd turn left") and avoided getting lost because of their familiarity with the area ("if I came in from out of town it would have taken me to who knows where"). Some also thought the guidance, even when it worked, did not get you close enough to your destination: "I expected it to be closer to where you wanted to go, it dropped you off too far away from where you were going. You're supposed to see your objective and half the time you couldn't." These experiences led participants to see the system as inaccurate and undependable, as one person summarized "I'd give it a chance, I'd always try but...where I knew it was giving me the wrong directions because I knew the area I didn't always follow it."

A second difficulty was that some participants found that sometimes when they followed the guidance it would suddenly cut out, for no apparent reason. Said one person, "the display says just keep going straight and all of a sudden you have left the recommended route. I hadn't done a thing. I got that several times," or "I ignored it most of the time and every once in a while would follow it just to see if anything changed..and it still dumped me. That got old." One person said, "what kind of got me was there were times when it was very good...so that kind of gave you a warm fuzzy to some extent, false sense of security because you could turn right around."

Finally, people did not view the routes they received as the best possible routes, neither the shortest nor the fastest. Stated one person, "I thought that it would sometimes take me directions that I felt were

wrong and that I wouldn't go because I felt there were shorter ways that I knew how to take." Another person said "I just wanted to see if it would take a different route and it did once or twice, but then that was it. I went my normal route, the one that everybody told me was the worst way to take, but Ali-Scout says it's the best." Another said, "I felt it wasn't really directing me the quickest routes. It didn't inform me why it would want me to go a certain way,"

Interestingly, one of the focus groups was not dominated by a discussion of the system's inaccuracies. This may be because some of these individuals had the vehicles later in the test, when some of the inaccuracies in the system may have been fixed. And one of the individuals in that group was new to the area, which seems to increase the likelihood that the system is perceived as having value. This uncertainty relates to the ongoing improvements made to the system over the course of the test and the result that it is not possible to determine for sure what was behind the differences among the focus groups.

Area Familiarity

With a fully functioning system, participants said the two most important improvements to the system would be the provision of routes based on real-time traffic conditions and wider coverage. Both of these improvements are a function of area familiarity; the importance of coverage and traffic information depends on whether the system is used in an area with which the driver is familiar or not.

First, for traffic information, several participants believed that the Ali-Scout routing would help them avoid congestion and construction but it did not. As one person stated, "them was an accident and it was stopped bumper to bumper, and we never knew anything about it until after we got past. It never said go a different route or turn a different way" Another person said, "I tended to ignore it towards the end. If it told me to turn left I actually ended up telling it to shut up because I could see if I turned I would be going into a bunch of traffic."

Given that the system was not yet capable of providing guidance based on traffic conditions, several individuals viewed the provision of such a capability key to the success of the system especially if people were to purchase the system for use in their local driving area; "the traffic information is important, you know where you're going." Another person said, "just to tell me how to get from Point A to Point B...it wouldn't be worth it to me. It'd have to tell me long range how to get around something." Similarly, another participant stated, "the only thing that I can see this unit would be helpful would be to get you around traffic jams or accidents. That would be a great boon to a lot of drivers." Said one person, "I don't want to be stuck in traffic with a carload of kids and if it can get me around that, then sure, that would make it real attractive to me." These participants viewed the traffic information as a key factor to determining whether or not the system would be of value to them

Second, for coverage, almost all respondents believed that regardless of the presence of traffic information, the system had to be broader than it was. Coverage could be improved in two ways: (1)increase beacon density, and (2)extend the beacon coverage area. For example, several people commented that even in the small test area, there did not seem to be a sufficient number of beacons for it to work well. One person stated, "the more beacons you hit, the better directions you get. Simple." Another person said, "I don't think much can be done to make it more accurate unless you put a zillion beacons out." One participant summarized that "the broader the range, the more useful it is." With respect to extending coverage, one participant stated, "I would purchase even for just the local area but if it covered more than one county, or more than one portion of the county, like the entire Detroit metro area would be useful." Most felt similarly, that coverage had to be broader than a metro area. "it would be really nice if some time in the future it was country wide," or "mine would have to be more on a national scale. If I wanted to go on vacation to Colorado, tell

it I want to go," or "I don't think you'd use it places where you would normally go, you're going to use it for long trips."

Traffic information and beacon coverage are interrelated with area familiarity. The system gains in value as it covers more areas with which drivers are not familiar. The dominant view was that the system was not useful because participants knew the area and already knew the best routes; "I could drive these roads in my sleep because I've lived there all my life and knew where I was going." Another said, "they give you this thing and the places you normally go you know how to get there as quick as you can." Because of this familiarity, participants generally did not have an opportunity to use Ali-Scout for new destinations; "I didn't have the opportunity in the time that we had it to really go anywhere other than work and school." Said another, 'I knew where I was going all the time. I had been to all of the destinations before so I knew most of the routes to get there." Some said it could have helped them if they had a new destination, "if I had somewhere to go that I didn't know where I was going and I plugged it in on there, I would prefer that to having written directions, especially at night." Another said, "I think it could have helped me if I would have had to go somewhere I haven't been." However, said one person "the thing that makes me wonder about its utility, even then, is that most of us go pretty much the same places time after time." Stated one individual succinctly, "we were all too familiar with the territory we were driving in." One person summarized the issue as follows:

> I'm sure if your primary use of the thing was just to get from Point A to Point B, I'm sure somebody would find that of value. But again, the repetitiveness where you go the same route everyday, there wouldn't be much value in just saying go left or go right, because you already know that. If it offers alternatives, it might be a day when a particular road closed only for that day, so it would be good to know about that.

For these reasons, participants viewed the provision of traffic information as useful to them in a familiar area, and the provision of broader coverage as useful for unfamiliar areas.

Minor Themes

Benefits

The drivers experienced some benefits through use of the system. The facilitator asked participants what they liked about the system, and because of system inaccuracies, people often responded that they liked it when it worked. As one individual shared, "I noted it was helpful once when I was using it, I was looking for a suite down a street that had a really small entrance. Fortunately it took me right in front of the building, right in front of the door practically using the address. And that really surprised me. I didn't think it could be that accurate." People liked it when it provided reliable, accurate directions.

Some people experienced Ali-Scout providing them with routes that improved upon their normal routes, "I actually found quicker ways at times with the routing. I didn't expect to take certain routes that it suggested." And another person said, "I ended up taking a different route home from work that I normally wouldn't have taken, that had me thinking twice about being an efficient or an effective route." Another major positive aspect was the importance of the voice as a component of the system. Most participants believed that Ali-Scout's use of audio instructions was effective and should be retained- "Voice is an important feature because you don't want to have to spend time looking at the screen."

Other aspects of their experience that people liked include the following:

- It was helpful if one was lost. ("I got lost in Pontiac. I chose home coordinates and it took me through to take I-75.")
- Lane recommendations. (,'It says pick one of the two right lanes. If I was somebody that didn't know that, that's good that it was knowledgeable

to let you know that you could take either lane and didn't have to stay all the way to the right. I thought that was cool.")

- The ability to remove Ali-Scout from the vehicle and program it indoors.
- The bar chart, representing proximity to the next turn.
- Crow flies direction: arrow, compass, miles to destination.
- Ground-based nature of the system (vs. satellite).
- Accuracy on the freeway.

Distraction

There is a question of whether or not Ali-Scout is distracting from the task of driving. There were some mixed opinions on the matter. One person said "I think a car phone is more distracting than Ali-Scout. I don't think it was distracting at all." Another person said, "when you're in heavy traffic you can't look to see where your destination is and if you had it programmed for an address it would tell you so you didn't have to take your eyes off the road that much." But another person had the opposite reaction:

> It was a distraction I think...by the time you could look up and see what the display said it was gone, and if you look instantly you're liable to run into somebody ahead of you. If I'm in the normal traffic I don't want a predicament at the whim of that machine to spend my time looking down to see what it's going to tell me.

Some participants suggested that the people to whom the system might be more distracting are those uncomfortable with technology. One person thought Ali-Scout "could be confusing in a negative way if you're not accustomed to it." And another individual stated, "I think that a lot of people that don't have a high degree of technical ability might have a real problem with it." Finally, one person suggested that "I think the reason it didn't distract from our normal driving was because we knew the routes we were taking. Had you been in a strange city using that system, it might have been a lot distracting." Again the issue of area familiarity arises; if this system really is of most value to people unfamiliar with an area, level of distraction needs to be assessed by people using the system in an unfamiliar area. In addition, as mentioned above in Benefits, the system's audio was considered key to minimizing the system's ability to distract the driver.

Insufficient Warning

Some people also thought that because of the speeds reached on the freeway, there was insufficient warning provided for taking the next direction, for example "if you're traveling the freeway at 55 miles an hour and you hit a beacon and it says get off at the next exit; you might have just passed one and then you're into a traffic tie up." People found that warnings, i.e. guidance instructions, need to take current traffic conditions into account: "I know with me a lot of times the warning it gave me was, rush hour would be pretty tight to just all of a sudden get into the right lane or make a left turn" or "I would see the road coming up but it wasn't enough time if the traffic was kind of heavy to get over in the turning lane." As is true with several situations already discussed, familiarity with an area affects the amount of warning necessary. As one person found, "sometimes it would tell you to get over and if you're on a four lane road that was not always possible if you were unfamiliar with the area." Another person said, "the advanced warning wasn't very good. If I was new to the area and I didn't know, I could have been in any of three lanes and getting from the left lane to the right lane in a five o'clock commute is next to impossible, and then they tell you with a half mile to go." So a perfected system needs to determine the appropriate warning time given use by people unfamiliar with an area as well as anticipated congestion conditions.

Who Pays?

Most of the focus groups involved a discussion about how a route guidance system should be funded. Several people felt strongly that it should be paid for 100% by the user because that is who will benefit: "I think it should be fully supported and paid for by the people who are using it and not anyone else." Therefore, how much should the government be involved?

> I have a real concern, should the government sponsor this and pay for it and all this kind of stuff? I have a real concern there where someone who can spend $1500 or two grand or a thousand bucks for these toys and then all the rest of the taxpayers are going to help pay for their toys. I have a problem with that.

Similarly, another individual stated:

> Seems to be an awful lot of overhead and the only real advantage of all that overhead is traffic control. To me it's like somebody's got to pay for that infrastructure. If that's going to be a ten dollar a month or whatever fee, I don't know about you guys but I wouldn't pay it. I wouldn't pay ten bucks a year for that. I'll sit in traffic. I'll use my own judgment, it's a fifty-fifty shot.

One person summarized this attitude, stating: "I think it's a matter of making it available to people who are willing to pay for that technology because it's important to them to save that time, or it's important to them to know that there's a problem coming up?

Concepts of Route Guidance

As part of this study, we wanted to learn what people thought of the concept of route guidance in general. Part of that included an attempt to have participants describe improvements to the system they experienced as well as the "ideal" system, given that they experienced route guidance implemented in one way. When considering the ideas generated, one must remember that participants only had experience with one system and that gaining experience with an improved, or "ideal," system, might refine their definitions.

Improvements

Based on their experiences, participants had a number of suggestions for improving a route guidance system. The following is a summary list of all suggestions from all focus groups. According to the participants in these focus groups, route guidance should have some or all of the following characteristics:

1. Easier destination entry: mouse click on locations, scan with bar codes (Many people found data entry cumbersome and time consuming-the buttons were too small, scrolling was inefficient. As one person said "make it a little more user friendly, convenient for people to use. Otherwise they're not going to bother with it.")
2. Say street names, not just "turn left;" say "exit" not just "turn"
3. Reason for different direction (weather, traffic accident?)
4. More menu driven
5. Ability to reset route if turn/exit is missed
6. Display: more detail; heads up display
7. Voice activation
8. On long trips, a friendly reminder you're still going right
9. Map (this was a popular idea with all the groups, even though they did not experience a map-based display)
10. Incorporate into other systems, not just something to give directions
11. Portable/removable for use in other vehicles
12. Update geographic components (new streets, business changes etc.)
13. More than just the 100 entries allowed
14. Have cellular phone attached for calling ahead (hotels, restaurants etc.)
15. Capable of remembering routes taken (not just destinations)

Participants also had some suggestions about to

whom this type of system might appeal and be useful: (1) someone new to an area, (2) chauffeurs, (3) delivery and sales people, (4) truck drivers, (5) emergency workers, (6) taxi drivers, (7) business travelers, (8) rental car agencies, and (9) vacationers.

Ideal Route Guidance

-The following is a single compiled definition using each person's stated "ideal":

> Ideal route guidance would...be economical, provide the shortest and best way around traffic and congestion, be accurate, have nationwide coverage, contain points of interest, have a distress signal, integrate a phone, have safety features, give short cuts, have a map that showed me where I am and where my destination is, be a satellite based map system, use audio commands, have a repeat button, provide alternate routes, be portable, be easily programmable, have coordinates pre-programmed for you, have a CD ROM to select coordinates, be dependable, and cover all, not just the main roads.

Some participants did indicate a willingness to purchase a system that fulfilled their concept of ideal route guidance. Amounts that people suggested as the amount of money they would be willing to spend on such a system ranged from as little as zero to as much as $2500, with most responses between $300 and $500. However, people also did not believe that such a system would ever be limited to a one time cost; rather, there would have to be a user fee involved, especially with necessary updates and if traffic information was provided. As one person said, "you would have to do a monthly fee, charge people as they use it. With all the updating that will go on, as roads change and cities expand, a one time fee isn't going to cover the cost of the service." It is important to remember that willingness to pay data cannot be scientifically collected via focus groups, because of the homogeneous nature of the group and because the results are not representative of a larger population.

It is significant that some people remained unwilling to pay anything for route guidance, even if it was their ideal. Said one person, "I think with the price of cars today, anything over and above people are really hesitant because cars are so expensive. So they add something that's going to be anywhere from $500-1000 or more, I think people would think 'well, I can sit in traffic a little while for that."' Also, not everyone was convinced that the traffic information provided would be quicker than what was already provided on the radio, and that it would be too late by the time it was received in the vehicle. One person questioned the value of the traffic information itself: "I don't know how much validity there is to try and go around [accidents] because there are only two or three main roads, and I mean wherever you're going, if traffic's bad they're just all a mess." And finally, with respect to how traffic information should be provided, one person asks, "the point is if you come right down to it, why have something in your car to tell you? Why not something on the freeway to tell everybody? Why leave it to us to buy something to get us through this?' A provocative question and one which will need to be answered as these systems hit the market.

CONCLUSION

It is important to remember that focus group data are not representative of the general population. These results only describe the experiences of those who participated in the focus groups. The results also describe dominant views, with an attempt to include minor views when relevant. When the results of all five focus groups are combined, the issues of accuracy, traffic information, and coverage area were discussed the most. People also had numerous suggestions for making route guidance better, such that they might purchase such a system. Are people interested in route guidance? To answer this, we must look at two separate conditions: driving in a familiar area and driving in an unfamiliar area.

First, for travel in a familiar area, it is largely viewed that the system needs to have traffic information integrated into the routing. People know their daily routes and they vary little; few are willing to pay hundreds of dollars for a system they might use once a month when they are content to use a map on those occasions. But, if you let people know what is ahead of them and provide them a route on which they can avoid congestion and construction, people are interested. However, exactly how interested and how much they would be willing to pay is unknown, and cannot be ascertained with this data set.

Another study, part of the ADVANCE OPT in Chicago, also used focus groups to determine people's responses to route guidance and had similar findings. As the conclusion summarizes:

> The results of this test suggest that familiar drivers know their road network and its recurring congestion patterns. Their route planning criteria are likely to differ from those used by publicly-sanctioned route guidance systems. On the other hand, such drivers show a strong interest in real-time traffic congestion information (Schafer et. al, 1996).

Second, for travel in an unfamiliar area, the system must have a much broader area than what is currently in place in Oakland County, Michigan. People want to be able to vacation to Florida or visit family in Chicago, and use a system that provides them with directions. Under these conditions, routing based on traffic conditions is not as necessary, although still popular

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ENDNOTES

1. Charmaz, Kathy. (1983). "The Grounded Theory Method: An Explication and Interpretation." ***Contemporary Field Research,*** Robert M. Emerson (Ed.). Waveland Press, Inc.: Prospect Heights, IL.
2. Knockeart, Ronald and Thomas J. Bauer. (1995). "FAST-TRAC." ***Trafic Technology International*** '95, Ian Nuttall (Ed.) UK & International Press: Survey, United Kingdom.
3. Morgan, David L. (1988). ***Focus Groups as Qualitative Research.*** Sage Publications, Inc.: Newbury Park, CA.
4. Schafer, Joseph L., Frank S. Koppelman, and William A. Charlton. (1996) "Familiar Driver Response to In-Vehicle Route Guid***ance*** Systems." ***Proceedings from the Third Annual World Congress on Intelligent Transport Systems.*** Edited by ITS America, Washington, D.C.
5. Stewart, David W. and Prem N. Shamdasani. (1990). ***Focus Groups: Theory and Practice.*** Sage Publications, Inc.: Newbury Park, CA.

APPENDIX A

Focus Group Interview Guide

GOAL.: Gather qualitative information about (1) what people think about Ali-Scout and why, (2) what participants experienced with Ali-Scout-anecdotal information on what really happened and uncover any surprises, (3) engage in a general discussion about the value of route guidance, and (4) discuss general willingness to purchase.

Introduction

Introduce myself, thank you for participating

Brief description of the goals for this exercise, overview of agenda, ground rules (listen, free to disagree, talk to each other, not me)

Audio Recording: for the purpose of capturing the discussion in full and writing the report; quotes will not be attributed to specific individuals-confidentiality

Introductions: name and share something good that's happened to you this week

Topics

Experience with Ali-Scout

Before you used Ali-Scout for the first time, what were your expectations?

Once it was installed, what were your first impressions?

How often did you use Ali-Scout?

Did using the system affect your driving? How?

> Describe a situation where you found it helpfill

What did you like most about the system? What benefits did you experience? Be specific.

> What did you dislike most about the system? Be specific.

> How would you improve the design?

* Storytelling: What is the strangest/tinniest/scariest thing that happened while you were using AliScout? go around and make sure everyone answers

> Overall, how would you describe your experience?

> Sentence Completion: Driving with Ali-Scout was.. .?

Purchase

Ali-Scout

Would you purchase Ali-Scout? Why/why not?

Sentence completion: I would purchase Ali-Scout if,. . ***make sure everyone answers***

General Route Guidance

What do you think about the concept of route guidance?

Describe what you think would be an ideal route guidance system.

What would you give up in your car to have a route guidance system?

What do you perceive as the key issue(s) determining purchase of a route guidance system?

How willing would you be to purchase a route guidance system? Amounts?

Sentence completion: I would purchase a route guidance system if.. .

Summary

Is there anything else about your experience you would like me to know?

Do you have any questions for me?

APPENDIX B

Analysis Categories

1. Lack of accuracy/inconsistent guidance
2. Distraction
3. Insufficient Warning
4. Who Pays?
5. Benefits
6. Ideal Route Guidance
7. Insufficient Beacons/Wider Area
8. Even if accurate, is the system/guidance useful?
9. Utility for Whom?
10. Programming/data entry difficulty
11. Area is too Familiar
12. Useful in unfamiliar areas
13. Needs traffic information
14. Does not need traffic information
15. Voice is important
16. Improvements/suggestions
17. Prefer a Map

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