THE UNIVERSITY OF MICHIGAN ITS DEPLOYMENT EXERCISE

SUMMARY REPORT

NOTE TO READER:

THIS IS A LARGE DOCUMENT

Due to its large size, this document has been segmented into multiple files. All files separate from this main document file are accessible from links (blue type) in the table of contents or the body of the document.

The University of Michigan ITS Deployment Exercise Summary Report

Prepared by the U of M - EECS Intelligent Transportation Research Lab

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ITS Deployment Exercise
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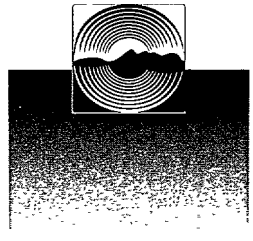

ITS Deployment Exercise Summary Report

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Introduction

On December 7 and 8, 1995, the Intelligent Transportation Systems Research Laboratory at the University of Michigan hosted the first run of the ITS Deployment Exercise in Ann Arbor, Michigan. This report describes the goals and procedures of the activity and provides a summary of the event.

The ITS Deployment Exercise is a managerial support system that uses gaming and other methods to assist with group policy exploration. The broad purpose of the Exercise is to facilitate communication among ITS stakeholders and interest groups so they may formulate a shared vision of potential deployment issues and identify high priority deployment initiatives.

Specific objectives of the initial workshop were:

- to develop a shared referent system and establish a framework for better communication;
- to help the participants understand and interrelate ITS stakeholder roles and relationships;
- to foster team-building;
- to determine stakeholders' deployment priorities;
- and to develop a preliminary Model Deployment plan for Southeast Michigan.

The ITS Deployment Exercise consists of two distinct but interrelated activities that were designed to work together: the Deployment Game and the Deployment Seminar. As shown in Figure 1, on the first day of the workshop, the participants played the Deployment Game, which introduced a framework for discussing stakeholder relationships. The second day of the workshop was devoted to the Deployment Seminar, in which participants identified stakeholder goals and worked toward developing consensus on deployment initiatives.

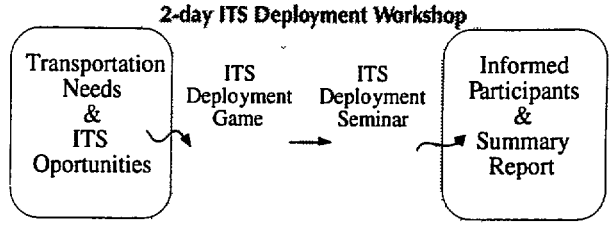

Figure 1: ITS Deployment Exercise

The "Cone of Abstraction", presented in Figure 2, shows how the Game and the Seminar relate to the many uncountable details and variables of "real-world" ITS deployment, which is represented by the bottom of the cone. Clearly, the "game world" operates at a higher level of abstraction than the "real-world", thus allowing the participants to explore high-level deployment issues and develop a shared language and referent system without being distracted by "real-world" details. During the Seminar, participants "move down the cone" to deal with numerous lower-level issues and details of ATMS/ATIS deployment. Figure 2 also identifies an ITS Deployment Schematic, or map, of the relationships between ITS and the broader world that links the Game and the Seminar on the Cone of Abstraction. This Schematic, presented in Figure 3, was used in the development of the Game and the Seminar. It shows how ITS technologies and polices influence and are influenced by various institutions and systems.

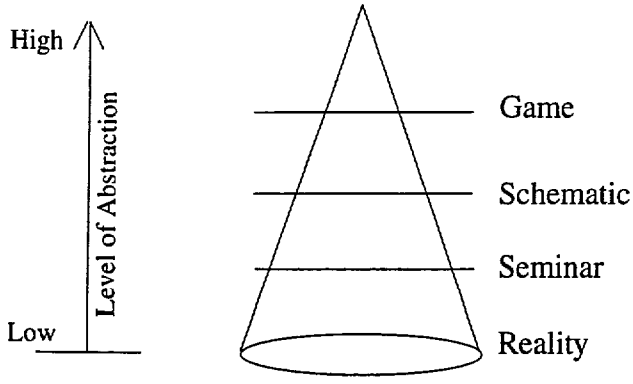

Figure 2: Cone of Abstraction

Another significant input to the development of the Game and Seminar was the Michigan ITS Strategic Planning Issues document given in Appendix A. As noted there, this "issues document" was prepared by Professor Kan Chen in November 1995 as a result of interviews with selected ITS Michigan Board members in October 1995. The primary function of the document is to support development of the Michigan ITS Strategic Plan.

Participants for the Deployment Exercise were carefully chosen to represent a broad spectrum of ITS stakeholders' viewpoints. The names and affiliations of the participants for the December 1995 Exercise are given in Appendix B.

The transparencies used in the introductory session of the Exercise are provided in Appendix C. The content of these slides will be covered in greater detail throughout the report and so the slides themselves will not be discussed further here.

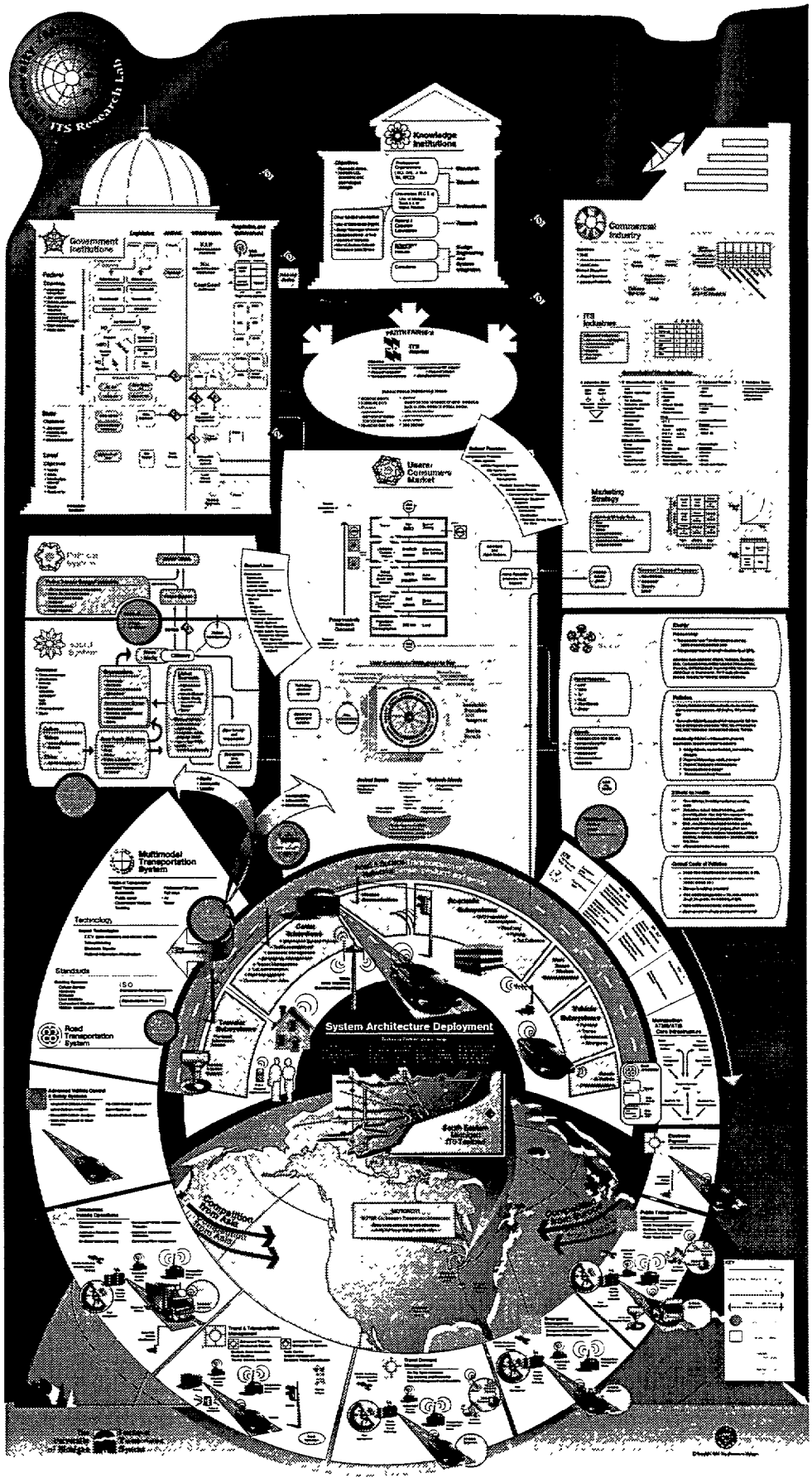

Figure 3: Schematic of the “ITS World”

ITS Deployment Game

The Deployment Game provided a risk-free environment for exploring roles and complex issues surrounding ITS deployment. The game was highly interactive and set the stage for more effective communication among the participants during the Deployment Seminar by introducing important concepts and information and helping the participants develop a "shared language" and "referent system." The participants' common experience gained while playing the game provided a foundation for more effective communication during the Deployment Seminar.

In the ITS Deployment Game, which was played out on the Game Board of Figure 4, the participants played roles of different stakeholders. As shown in Table 1, there were twenty-one different roles divided into seven perspectives integral to developing a wide understanding of ITS deployment issues and priorities. The roles are described in more detail in Appendix D. In the game, most of the participants played a role different from the one they exercised in the "real world" in order to encourage them to think from a different point of view.

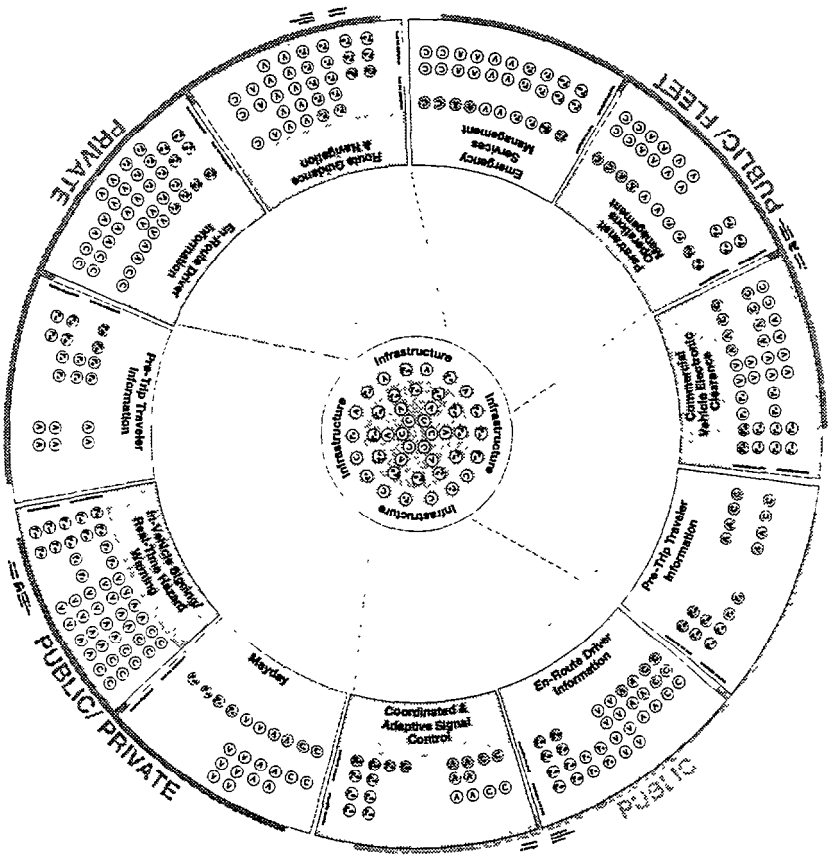

Figure 4: ITS Deployment Exercise Game Board

Table 1: Perspectives and Roles Played in the Game

Perspectives	Roles	Participants
Auto Makers	Company A	Ivy Renga
	Company B	Kunwar Rajendra
	Company C	Oscar Villalvazo
Consumers	Commercial Vehicle	Mac (Harry) Lister
	Private Traveler	Melvin Rode
	Government Procurement	Morrie Hoevel
Federal and State	Federal (FHWA)	Martin Monahan
	State (MDOT)	Edward Greene
	Enforcement	James Bolger
Interest Groups	Civil Liberties	Russell Gronevelt
	Environment	Joseph Saul
	Transportation Disadvantaged	Kan Chen
Local Government	Regional	Brent Bair
	County	Thomas Wissing
	Local	Albert Martin
Researchers	Aerospace	Chelsea White
	Private Consultant	Donald Ome
	University	Greg Cook
Telecommunications/ Electronics	Auto Supplier	Jay Asel
	Communication Service Provider	Paul Lescoe
	Information Service Provider	James Barbaresso

At the beginning of the game, the participants worked together within their perspective groups to identify a small number of benefits that represented what they wanted to gain from ITS deployment. These benefits were chosen from the list in Table 2. The benefits are described in more detail in Appendix E.

The participants then played through a series of game cycles during which they attempted to deploy a selected number of ITS services, which are shown on the Game Board of Figure 4 and described in more detail in Appendix F. Each cycle represented two years.

The objective of the Game was for participants to attempt to deploy the ITS services that most increased the amount of benefit they received. The participants had to negotiate with other perspective groups in order to come to an agreement on what services to deploy. Negotiation with other perspective was a critical part of the cycle. Due to the Game design, none of the services could be deployed without some cooperation between two or more perspective groups as no one group had a monopoly on all the resources and authority necessary to make deployment of ITS services a reality. Through playing the Game, participants experienced the value of cooperation and communication. After playing through a number of cycles, the game facilitator led the participants in a debriefing session. Participants commented that the Game provided a freedom of communication and the ability to see other viewpoints, benefits which are often lacking in other forums. On the whole, the participants highly enjoyed the Deployment Game, and it was a very exciting and productive time for everyone.

Table 2: Facilitator-Suggested Benefits That Might Accrue From ITS Deployment

Transportation Operations	Increased System Throughput	Reduced Duration & Variance of Travel Time	Integration of Transportation Modes	
Community Welfare	Healthier Environment	More Efficient & Sustainable Use of Current & New Resources		
Personal Welfare	Enhanced Safety	Enhanced Security	Reduced Traveler Stress	
Mobility	Improved Public Transit	Broadened Travel Opportunities	GreaterTraveler Independence	
Economic Strength	Increased Productivity	Enhanced Industry Competitiveness	New Industries and Jobs	Increased Tourism
ITS Growth	Greater Awareness of ITS	Existence of an ITS Infrastructure to Facilitate Product Development	Expanded Knowledge Base	
Regulation & Commerce	More Efficient & Equitable Fee Collection	More Efficient & Fair Regulation and Enforcement	Facilitated Movement of Interjurisdictional Goods	

ITS Deployment Seminar

The Deployment Seminar was planned to consist of seven steps designed to help guide the participants toward their ultimate goal: a proposed plan for ATMS/ATIS Model Deployment in Southeast Michigan. The steps were:

1. Facilitator Introduces Participants and Presents a Seminar Overview
2. Perspectives Identify Potential Benefits That Might Accrue From ITS Deployment
3. Facilitator Introduces a Strawman Deployment Plan
4. Perspectives Select Three Services and Suggest Modifications to the Strawman
5. Facilitator Generates and Presents a Revised Strawman Deployment Plan
6. Perspectives Collaborate to Modify the Revised Strawman Deployment Plan
7. Facilitator Summarizes and Asks "What Comes Next?"

The actual process during the Seminar, however, differed somewhat from the planned seven steps. This outcome was not unanticipated as the Exercise was run two months earlier than scheduled to accommodate participant interest in the U.S. DOT Model Deployment RFP, which many thought would be released in December 1995. The shortened time frame for preparation precluded a number of the test runs normally undertaken in the Seminar development process. As a result, the time allocated for Steps 3 and 4 was somewhat less than needed and the Seminar fell behind schedule. To allow the Seminar to proceed in a profitable manner, Step 5 was modified on-the-spot. The modified Step 5, called Step 5* in this report, called for each perspective to develop and present their own version of a Revised Strawman Deployment Plan, instead of having the facilitator develop and present a unified Revised Strawman Deployment Plan. Due to time constraints, Step 6, where the perspectives were to negotiate agreement on the Revised Strawman Deployment Plan was reduced to a brief and general discussion. To compensate for the lack of opportunity for the entire group to interact over a unified Revised Strawman Deployment Plan, this report presents a Facilitator-Generated Revised Strawman Deployment Plan, as a modified Step 6, that is, Step 6*. This plan was generated after the Seminar and is based upon the revised plans of the participants. We hope that the participants will collaborate to scrutinize and revise the plan according to shared needs and specifications. The following sections steps describe Steps 1 through 4, Step 5*, 6*, and 7 in greater detail.

Step 1. Facilitator Introduces Participants and Presents a Seminar Overview

Objective: To acquaint participants with each other and provide an overview of the Seminar.

Process: The facilitator introduced the Seminar, including the seven steps described above, and reviewed the objectives. Role and perspective assignments were confirmed, and the participants briefly introduced themselves to the group. The Seminar used the same roles and perspective groups as the Game, but in the Seminar the participants were specifically

Table 3: Perspectives and Roles Used in the Seminar

Perspective	Role	Participant
Auto Makers	Company A	Kan Chen
	Company B	Ivy Renga
	Company C	Edward Greene
Consumers	Private Traveler	Mac (Harry) Lister
	Commercial Vehicles	Paul Lescoe
	Government Procurement	Morrie Hoevel
Federal & State Government	Federal	Martin Monahan
	State	Kunwar Rajendra
	Enforcement	James Bolger
Interest Groups	Transportation Disadvantaged	Greg Cook
	Environment	Russell Gronevelt
	Civil Liberties	Joseph Saul
Local Government	Regional	James Barbaresso
	County	Brent Bair
	Local	Albert Martin
Researchers	Aerospace	Oscar Villalvazo
	Universities	Chelsea White
	Consultants	Donald Orne
Telecommunications/Electronics	Auto Suppliers	Thomas Wissing
	Communications	Jay Asel
	Service Suppliers	Mel Rode

assigned to roles in which they were knowledgeable. The Seminar role assignments are shown in Table 3. Whenever possible, the role assigned to a participant correlated with their "real world" job.

Results: A group of participants ready to discuss ITS issues and attempt to take a first cut at drafting an ITS Deployment Plan for Southeast Michigan.

Step 2. Perspectives Identify Potential Benefits that Might Accrue From ITS Deployment

Objective: To establish motivating forces for each perspective and to compare for differences and similarities among the perspectives.

Process: Participants were provided with a list of suggested benefits, shown earlier in Table 2 and described in more detail in Appendix E, to stimulate discussion. Each perspective group chose a set of "benefits" that represented what they want to achieve from ITS deployment in Southeast Michigan. In contrast to the Game, participants could select benefits other than those suggested if they desired. In order to represent the relative importance of the benefits, participants prioritized their objectives by assigning a percentage to each one (the total of all benefits for a perspective thus equaled 100%). In practice, each perspective group filled in a benefits "pie-chart." A representative from each group presented their perspective's benefits in a round-robin discussion.

Results: An evaluation and comparison of expected and desired benefits from each perspective group.

The "benefit" choices made by each of the seven perspective groups are highlighted in the following pages. Quotes shown come directly from the Seminar. The pie-charts presented by the perspectives are given in Appendix G.

Auto Makers:

The Auto Makers began their presentation by pointing out that one of the main reasons that they are in business is to provide return on investment to their stockholders; and therefore, all of their benefits are directed toward this goal. They then divided their pie-chart into the following major pieces:

- Consumer Benefits and Competitiveness 50%
- Federal & State Regulatory Compliance 25%
- Manufacturing 25%

Each of these sections were sub-divided into specific benefits and services. These range from emissions control, just-in-time parts delivery, and customer safety and security, to increasing tourism and creating new business as a result of current and future ITS technologies. Ultimately, in order to make a profit, ITS products and services must be competitively priced, be efficiently manufactured, and offer features that customers want. As the Auto Makers perspective said, "Customers, local and in the U.S. are going to have to appreciate the value, or again, we won't be able to sell the car."

Consumers:

The Consumers had objectives in five main areas, and they divided their pie-chart into the following pieces:

- Safety and Security 30%
- Variation in Travel Time 30%
- Intermodal Transportation/Integration (of Transportation Means) 20%
- Industry Competitiveness 15%
- Shared Infrastructure 5%

Consumers were interested in reduction of accidents and collisions and in personal security, in terms of being able to report maydays and breakdowns. They wanted to be able to accurately plan the travel time needed to arrive at a destination. As they said, "I don't want to be late for work. The employer doesn't like that. I don't want to be early for work, because I don't want to give the employer any more than what he deserves." The Consumers perspective was interested in integrating travel mbdes that would allow them to choose their transportation mode and to combine different modes of transportation to reach a destination more reliably. Industry competitiveness was also important to them as competitive markets mean less expensive products. Finally, they were interested in a shared infrastructure. They do not want to have to pay for both a public infrastructure and a private infrastructure.

Federal & State:

The Federal & State Perspective group divided their pie-chart into the following pieces:

- System Throughput 35%
- Traffic Safety 20%
- Security (defined as Law Enforcement, EMS, Police and Fire response) 15%
- Moving of Goods 10%
- Integration of Traffic Modes 10%
- Environment 5%
- Tourism 5%

The Federal & State Perspective group took the approach of looking, "at our customers as who we serve," and reflecting on "what the role of government is." They wanted to consider their special interest groups as well as make the system easier to use by the system's consumers. They also believed that government should be very involved in marketing ITS and in educating the public about how ITS services can improve the transportation system.

Interest Groups:

The Interest Groups Perspective divided their pie chart into the following pieces:

- Minimize Negative Environmental Impacts 25%
- Efficient Use of Existing infrastructure 25%
- Meet Basic Mobility Needs of Transportation Disadvantaged 30%
- Provide User Control over Personal Information 20%

The Interest Group Perspective represented a group of people with a very divergent selection of interests. Environmental concerns represented 50% of their pie chart (split between the first two benefits listed) as they felt that this represented the interests of the largest segment of the population supporting special interest concerns. They wanted to minimize negative environmental impacts of new ITS services and to reduce cost by efficiently using the existing infrastructure. The Interest Group Perspective also wanted to address the basic mobility needs of the transportation disadvantaged; a large number of these people have no other option than public transit. Finally, they also represented the individual person's desire for personal and civil liberties.

Local Government:

The Local Government Perspective had objectives in six areas, and they divided their pie-chart into the following pieces:

- Increase System Throughput 25%
- Enhanced Safety 25%
- Improve Public Transportation 15%
- New Jobs 15%
- Reduced Travel Time 12.5%
- Efficient Resources and Better Planning 7.5%

The Local Government Perspective felt that the two most important goals for them were increased travel throughput and increased travel safety. Improving public transportation was also important. The creation of new jobs was important for improving the tax base, which is how they would then afford to be able to achieve their other goals. They were also interested in reduced travel times. The Local Government Perspective felt that accomplishing these four objectives was key to being able to address other ITS-related objectives in the future. Finally, the Local Government believed that efficient use of resources and better planning was necessary in order to accomplish their objectives. They want a comprehensive strategy that "involves planning, better land use, and additional infrastructure and improvement necessary to improve the transportation network."The Local Government Perspective felt that ITS can improve the operational efficiency of the government organization, but they also felt that this was not adequately addressed by the Deployment Exercise.

Researchers:

The Researchers Perspective titled their pie chart as "Enhance the Development of a Viable Sustainable ITS Industry for both the Public and Private interests." They had objectives in four areas, and they divided their pie-chart into the following pieces:

- Revenue Stream 40%
- Leadership/Clout/Politics 35%
- Knowledge Base 12.5%
- Talent Pool 12.5%

The Researchers Perspective felt that in order for ITS to benefit them and in order for them to serve their customers well, they had to have a long-term presence and continuity. Within this context, they require a revenue stream and "leadership/clout/politics." Without these two, the researchers will not be able to accomplish anything. In doing research, the Researchers Perspective said they will develop and provide a knowledge base. University research also creates a talent pool from which the aerospace and consulting researchers draw. Ultimately, through the development of ITS services and products, the end-user customer benefits from the establishment of a knowledge base and talent pool.

Telecommunications & Electronics:

The Telecommunications & Electronics Perspective had objectives in four areas, and they divided their pie-chart into the following pieces:

- Test Bed/Showcase 30%
- Development OME (Original Manufacture of Equipment) 30%
- Telephone/Information Super Highway Network 30%
- Revenue 10%

The most interesting thing to note is the small importance that theTelecommunications & Electronics Perspective assigned to revenue. They felt that it was more important to develop a test bed and set a national example for ITS deployment. Their revenue is going to come later down the road if ITS products that they can sell are developed. The Telecommunications & Electronics Perspective placed high importance on developing a test bed to showcase Southeast Michigan and what ITS Michigan could do for other parts of the state, region, and even the country. They thought that the main way that they will benefit from ITS is through the manufacture of equipment. The Telecommunications & Electronics Perspective want to work jointly with other telecommunications and electronics corporations and the auto makers as this helps everyone better develop and market their products. Finally, theTelecommunications & Electronics Perspective felt that the most cost effective way to develop their strategy was to make the best possible use of existing infrastructure, such as the currently deployed telephone and information super highway networks.

Step 3. Facilitator Introduces a Strawman Deployment Plan

Objective: To provide** a **point of departure for discussion and development of a potential deployment plan.

Process: The Facilitator presented a Strawman Deployment Plan, which was a rough deployment plan put together by ITS experts at the University of Michigan. The Strawman consisted of a set number of ITS Services deployed in well-defined geographic areas through the use of specific kinds of ITS Subsystems. The Strawman used the same subset of ATMS/ATIS and CVO services used in the Game, the geographical areas were encompassed within Southeast Michigan, and the subsystems were Surveillance, Traffic Control, Vehicles, Payment, Traveler, Institutions, Centers, and Roadside Communications. Each of these subsystems is explained in more depth in Appendix H. The subsystem descriptions include the technology choices that could be used to deploy the subsystems. The Strawman Deployment Plan presented is defined through the ITS Services Coverage Map and the ITS Subsystems Deployment Map, Figures 5 and 6, respectively. In practice, design decisions were made using the aid represented in Figure 7 and then transferred to Figures 5 and 6. The Strawman design for each of the eleven services is presented in Appendix I. The Services Coverage Map shows which ITS are to be deployed and at what locations. The Subsystems Deployment Map shows how the ITS are to be deployed.

Results: The participants developed a general understanding of the deployment planning framework. Moreover, the Strawman provided a starting point for the development of a proposed Model Deployment Plan that would

be acceptable to all participants. For the rest of the seminar, the participants concentrated on modifying the Strawman, looking for ways to best increase the amount of benefit they received.

ITS Service Coverage Map

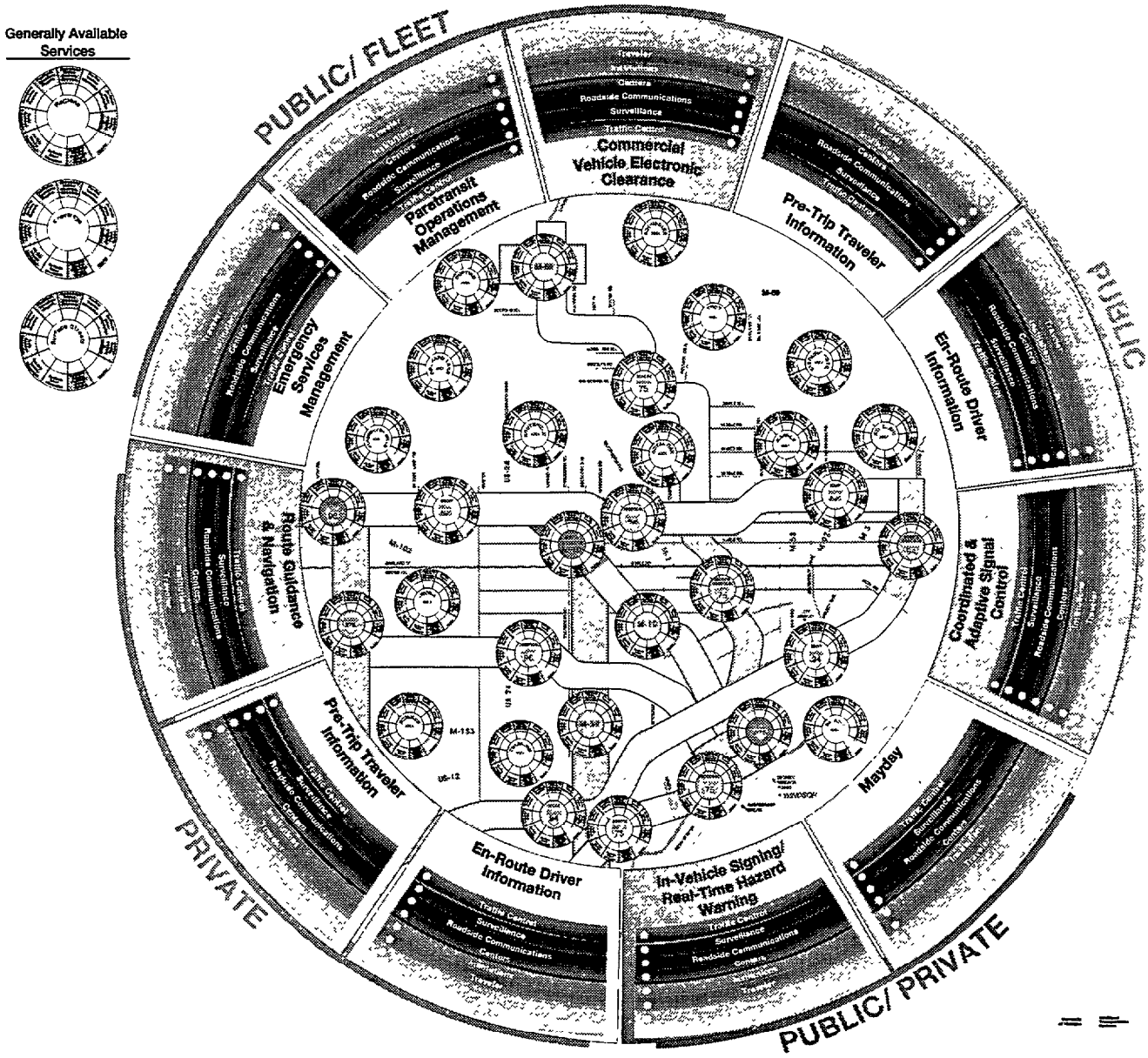

Figure 5: ITS Services Coverage Map for the Strawman Deployment Plan

ITS Subsystems Deployment Map

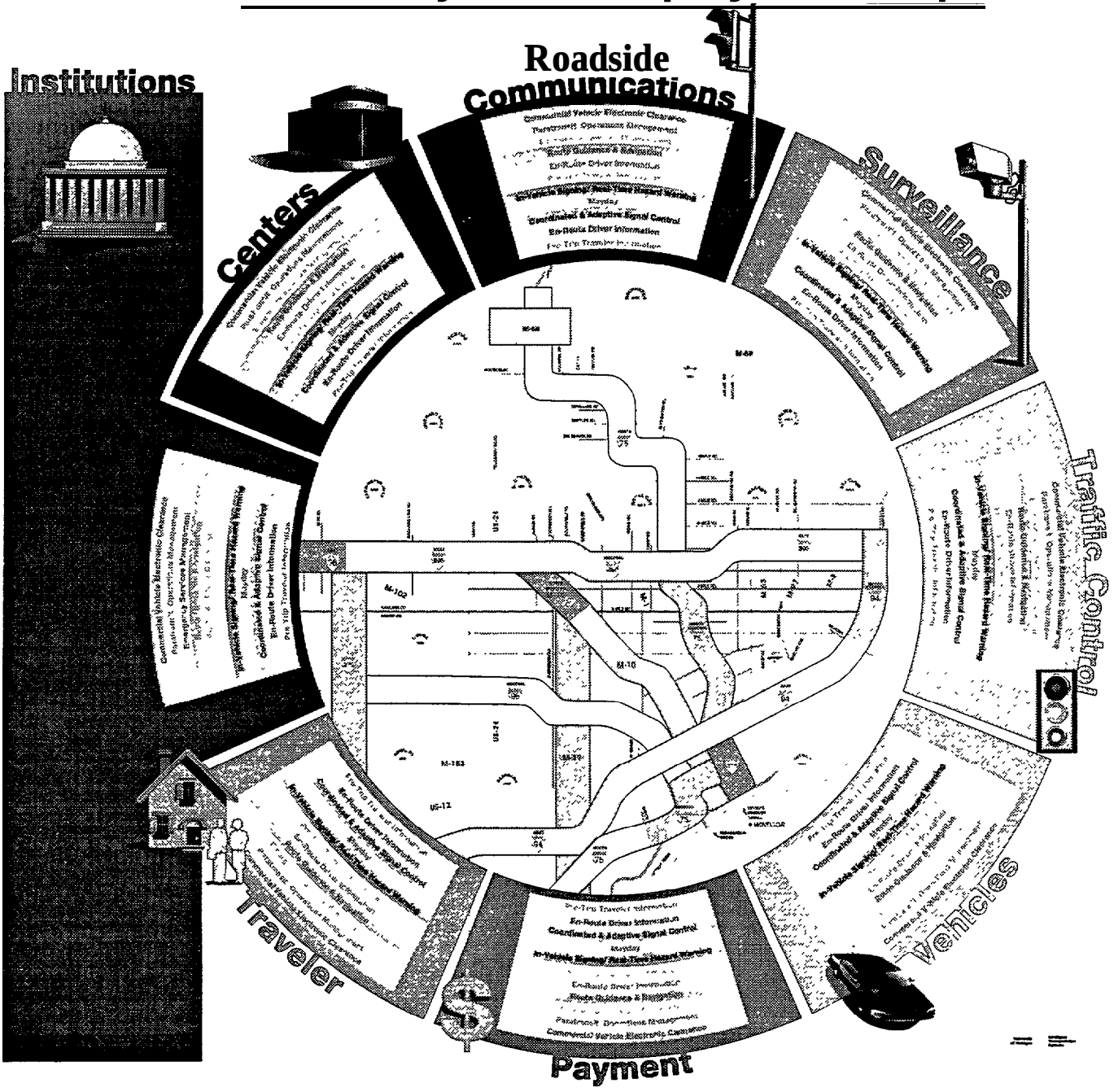

Figure 6: ITS Subsystems Deployment Map for the Strawman Deployment Plan

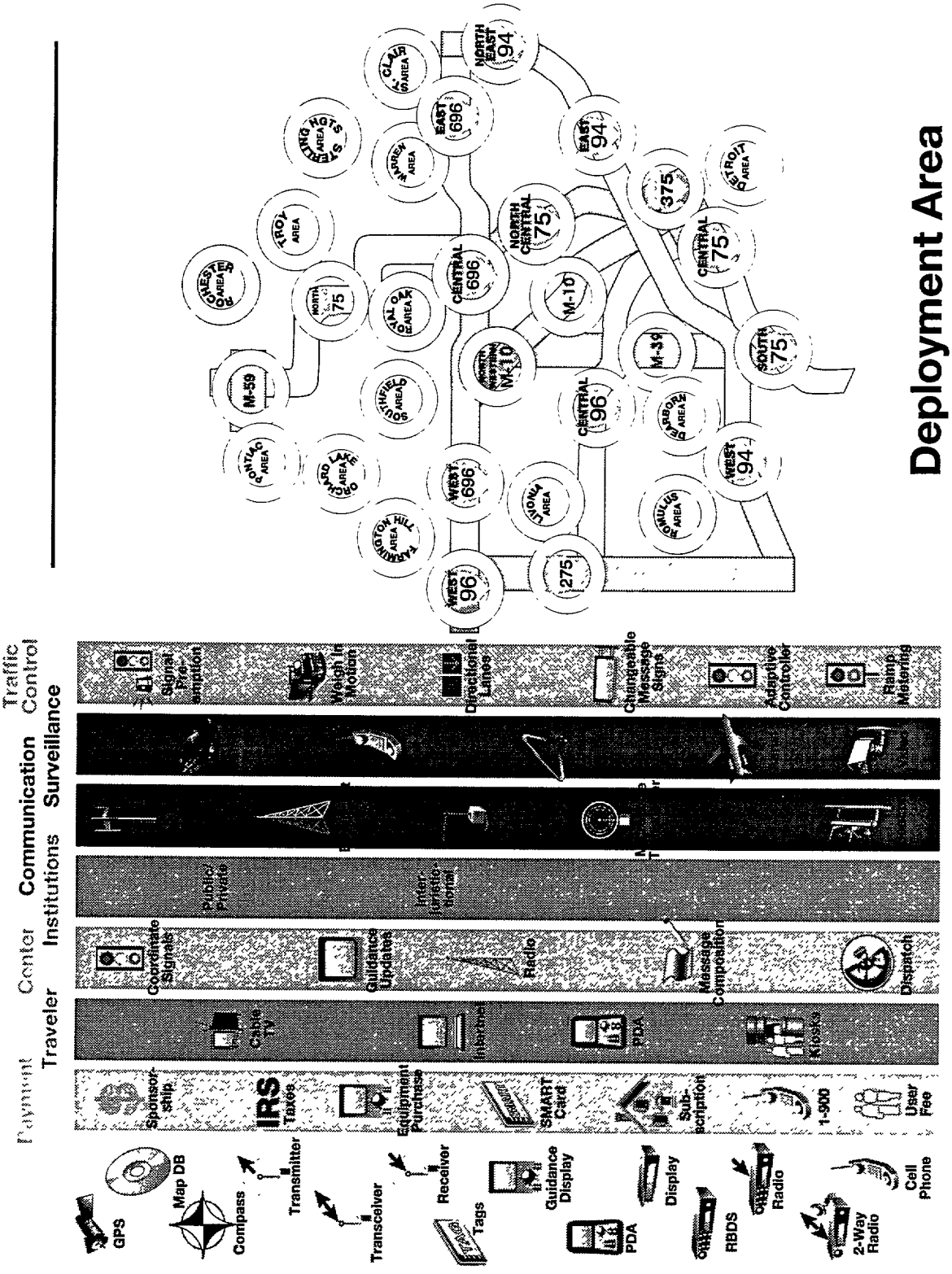

Figure 7: Deployment Planning Tool Provided to Participants

Step 4. Perspectives Select Three Services and Suggest Modifications to the Strawman

Objectives: To identify highest priority services, plan service coverage, and establish general designs for selected services.

Process: Each perspective group selected up to three priority services to deploy that, with proper modification, would best help increase the "benefits" that they identified in Step 2. The groups then looked at how their chosen services were deployed on the Strawman Deployment Plan and decided on what changes, if any, they would make. Part of this task involved selecting what equipment and infrastructure would be used to deploy their chosen services over what coverage area on their own copy of the Deployment Map. Participants were provided with the tool shown in Figure 7 to help in this task. They filled out one such figure for each of the services they selected. The recommendations were for ten years into the future and also unconstrained by cost, to encourage the participants to develop the best possible plans. The participants were allowed to modify any part of the plan as they required. A representative then presented their revisions to the group.

Results: A basic understanding of the deployment priorities and preferred deployment methods of each perspective group.

The services selected by each perspective group are given in Table 4. The choices/ comments made related to the Strawman are presented in the following pages. The level of detail given is directly related to the level of detail in the explanation the perspectives presented to the whole group. The actual figures used, one filled-in version of Figure 6 from above for each Service selected, are given in Appendix J.

Auto Makers:

The strategy of the Auto Makers Perspective was to minimize the number of investments for the maximum amount of return. Their main goal was to improve the connectivity between the vehicle that is driving on the roadways and the infrastructure or roadside devices/resources.

In-vehicle signing/Real-time Hazard Warning

Subsystem	Choice/Comment
Surveillance	All available bchnologies selected. "Sensors" and "detectors" added. Sensors would be used to monitor roadways to better identify hazards.
Traffic Control	No choice/comments recorded.
Vehicles	A minimumrequirement of a receiver for in-vehicle signing and hazard warnings, though at a slightly higher cost a transceiver is recommended as more efficient. Audio augmentation of the visual display warnings desired. The technology may evolve into some kind of PDA or other pocket-sized device.
Payment	Subsystem was subtitled "revenue," and SMART cards, subscriptions, and user fees were selected. "Advertisement" added.
Traveler	No choice/comments recorded.
Institutions	Public/Private.
Centers	No choice/comments recorded.
Communications	The basic building block of the system was a single microwave transceiver (5.8 GHz suggested) that would serve both the auto industry and the long-term infrastructure. One device, it was reasoned would be most efficient and cost effective.
Deployment Area	All arterial streets and highways in Southeast Michigan.

Commercial Vehicle Electronic Clearance

Subsystem	Choice/Comment
Surveillance	Vehicle probes for vehicle identification, cargo identification, and other information gathering and accounting purposes.
Traffic Control	Weigh-in-motion.
Vehicles	Transceivers that could possibly be augmented by a tag system. Visual display and audio enunciation to inform the driver of weigh stations or border crossings or any other necessary communications. This system could also be used to collect revenue at border crossings.
Payment	No choice/comments recorded.
Traveler	No choice/comments recorded.
institutions	Public/Private and interjurisdictional (interstate and international).
Centers	A center called "Credentials Data Center" added.
Communications	Based on the microwave transceiver "connectivity system" outlined in the plan for In-vehicle signing/Real-time Hazard Warning.
Deployment Area	Entry points into the Southeast Michigan region. Key points identified were the border crossing between Detroit and Windsor, I-75 north of Detroit, I-75 south of Detroit, I-96 west of metro Detroit, and I-96 east of Detroit

En-route Driver Information (public or private)

Subsystem	Choice/Comment
Surveillance	For a two-way communications system, vehicle probes would be necessary.
Traffic Control	No choice/comments recorded.
Vehicles	Receivers as a low cost alternative, though transceivers or some kind of two-way functionality preferred. In-vehicle displays and audio desired, though the possibility exists for some kind of PDA providing a more personal en-route Information service.
Payment	Sponsorship, subscriptions, SMART cards. "Advertisers" added. "It would not have to be publicly funded."
Traveler	No choice/comments recorded.
Institutions	Public/Private, interjurisdictional. "Just public" and "just private" added.
Centers	"ISP" added.
Communications	**Recommend using the same microwave transceiver system specified for other chosen services. Recognized that cellular network and broad**cast stations already in existence will also be used for en-route driver in**formation though these will not likely be endorsed or encouraged by the auto industry.**
Deployment Area	Entire Southeast Michigan region.

Consumers:

The Consumers Perspective emphasized in-vehicle technologies. They were concerned about getting the most accurate and up-to-date information when they needed it. This is in accordance with their desire to get to their destination not only in a timely fashion, but in a predictable and consistent fashion. They deployed each of their chosen services throughout the entire Southeast Michigan region. Anything less, they felt, would reduce the value of the service to the user. As full regional deployment can not happen overnight, they suggest starting at a "center point" (Livonia/Farmington) and expanding outward. They expressed some dissatisfaction with the fact that government and industry plan to spend money on an infrastructure, but have not included consumers' opinions from the beginning of the development process.

Commercial Vehicle Electronic Clearance

Subsystem	Choice/Comment
Surveillance	Vehicle probe.
Traffic Control	Weigh-in-motion.
Vehicles	Transceiver and tags.
Payment	User fee.
Traveler	No choice/comments recorded.
Institutions	Public/Private.
Centers	No choice/comments recorded.
Communications	Cellular.
Deployment Area	Entire Southeast Michigan region.

En-route Driver Information (Public)

Subsystem	Choice/Comment
Surveillance	Vehicle probe, call-in, loops, and video.
Traffic Control	Changeable message signs.
Vehicles	RBDS, radio, and cell phone.
Payment	Pointed out that consumers do not want to pay for this service.
Traveler	PDA.
Institutions	No choice/comments recorded.
Centers	Guidance updates, radio, and message composition.
Communications	Broadcast, HAR.
Deployment Area	Entire Southeast Michigan region.

Route Guidance & Navigation

Subsystem	Choice/Comment
Surveillance	Vehicle probe, call-in, aerial, and video.
Traffic Control	No choice/comments recorded.
Vehicles	GPS, map DB, compass, guidance display, and RBDS.
Payment	Equipment purchase and subscriptions.
Traveler	Internet, PDA, and kiosks. Key point is that a dynamic navigation system should work with the aviation community for travelers who are going to airports.
Institutions	Public/Private and interjurisdictional.
Centers	Guidance updates.
Communications	Beacons.
Deployment Area	Entire Southeast Michigan region.

Federal & State:

The Federal & State Perspective chose three services that they felt represented the top 50% of their interests in ITS deployment. In developing their recommendations, the Federal & State Perspective did not restrain themselves fiscally. The Federal & State Perspective retained their charts at the end of the Exercise and so their general recommendations are taken only from the Seminar transcript.

En-route Driver Information (Public)

Subsystem	Choice/Comment
Surveillance	Probes. (Already in use in Oakland county.)
Traffic Control	No choice/comments recorded.
Vehicles	Some in-vehicle route guidance.
Payment	No choice/comments recorded.
Traveler	No choice/comments recorded.
Institutions	No choice/comments recorded.
Centers	No choice/comments recorded.
Communications	Area-wide broadcasts with radio, cell phone.
Deployment Area	Seven county area of Metro Detroit.

Coordinated & Adaptive Signal Control

Subsystem	Choice/Comment
Surveillance	No choice/comments recorded.
Traffic Control	Pre-emption that would serve Emergency Services Management.
Vehicles	No choice/comments recorded.
Payment	Taxes.
Traveler	No choice/comments recorded.
Institutions	No choice/comments recorded.
Centers	No choice/comments recorded.
Communications	Fiber or co-axial cable.
Deployment Area	In about 30- 40% of Southeast Michigan.

Emergency Services Management

Subsystem	Choice/Comment
Surveillance	No choice/comments recorded.
Traffic Control	No choice/comments recorded.
Vehicles	No choice/comments recorded.
Payment	Taxes.
Traveler	No choice/comments recorded.
Institutions	Interjurisdictional issues key for making ESM work.
Centers	No choice/comments recorded.
Communications	Individual traveler would use cell phones.
Deployment Area	Seven county Metro Detroit region.

Interest Groups:

The Interest Groups Perspective is not interested so much in what services are deployed, but more in how services are deployed, and how the information that is needed and used in order to coordinate them, is then used and/or made available. They omitted some areas of the Strawman because they felt that they were not priority areas. Their recommendations make great use of existing infrastructure as this was viewed to be more environmentally sound than new construction. Many of technologies they chose for their three services were selected for their non-intrusive characteristics. Their desire is “that personal information about people is handled in a way that is consistent with interests of privacy and a desire to control that information.”

Paratransit Operations Management

Subsystem	Choice/Comment
Surveillance	No choice/comments recorded.
Traffic Control	No choice/comments recorded.
Vehicles	GPS, compass, and two-way radio.
Payment	Taxes, SMART card, and subscription.
Traveler	This service serves the needs of the transportation disadvantaged.
Institutions	Interjurisdictional.
Centers	Radio and dispatch.
Communications	Beacons.
Deployment Area	Entire Southeast Michigan region, but especially Oakland County.

Pre-trip Traveler Information (Private)

Subsystem	Choice/Comment
Surveillance	Call-in and aerial.
Traffic Control	No choice/comments recorded.
Vehicles	No choice/comments recorded.
Payment	Sponsorship, subscription, 900.
Traveler	Cable TV, intemet, PDA, kiosks. “Phone” added.
Institutions	Interjurisdictional.
Centers	Message composition.
Communications	No choice/comments recorded.
Deployment Area	Entire Southeast Michigan region.

Coordinate & Adaptive Signal Control

Subsystem	Choice/Comment
Surveillance	Loops and video.
Traffic Control	Directional lanes, changeable message signs, and adaptive controllers.
Vehicles	No choice/comments recorded.
Payment	Taxes.
Traveler	No choice/comments recorded.
Institutions	Interjurisdictional.
Centers	Coordinate signals.
Communications	Renamed “Roadside Communication.” “Cable” added.
Deployment Area	Across most of Southeast Michigan, concentrating primarily in the North. Key points are marked on the map.

Local Government:

The Local Government Perspective concentrated on meeting their two primary goals, which were system throughput and enhanced safety. Effective and useful surveillance was an important aspect for each of their service recommendations.

Emergency Services Management

Subsystem	Choice/Comment
Surveillance	Vehicle probe, call-in, loop, video.
Traffic Control	Signal preemption, changeable message signs, adaptive controller, and ramp metering.
Vehicles	GPS, transceiver, display, two-way radio, cell phone.
Payment	Taxes and user fees.
Traveler	"Phone" added.
Institutions	Public/Private and interjurisdictional.
Centers	Guidance updates, radio, message composition, dispatch. incident management model used. Non-transportation types of emergencies, such as when someone calls in an emergency from home, not considered.
Communications	Cellular, broadcast.
Deployment Area	No choice/comments recorded.

Coordinated & Adaptive Signal Control

Subsystem	Choice/Comment
Surveillance	Vehicle probe, loops, and video.
Traffic Control	Signal preemption, directional lanes, adaptive signals, ramp metering.
Vehicles	GPS, transmitter.
Payment	Sponsorship, taxes, user fee.
Traveler	No choice/comments recorded.
Institutions	Public/Private and interjurisdictional.
Centers	Coordinating signals and radio. Integration of information from "other" systems not considered.
Communications	Cellular, broadcasting, microwave transceiver, beacons. "Land lines" added.
Deployment Area	In all cities in the Southeast Michigan region.

Pre-trip Traveler Information (Public)

Subsystem	Choice/Comment
Surveillance	Vehicle probe, call in, loops, aerial, video. "Manual inputs" (construction, phoned events) added. Surveillance identified as a very important part of this service. Surveillance can also provide weather information and road surface conditions.
Traffic Control	No choice/comments recorded.
Vehicles	No choice/comments recorded.
Payment	Sponsorship, taxes, equipment purchase, SMART card, subscriptions, I-900, and user fee.
Traveler	Cable TV, intemet, PDA, kiosks. "Phone" and commercial TV and radio added. . .
Institutions	Public/Private and interjurisdictional. "Private-private" partnerships added.
Centers	Guidance updates, message composition, and TripTik.
Communications	Cellular and broadcast. "LAN" and "land line WAN" added.
Deployment Area	On all freeways.

Researchers:

The Researchers Perspective concentrated on three services. Their big issues are making the right data available in useful ways and increasing public awareness.

Emergency Services Management

Subsystem	Choice/Comment
Surveillance	Vehicle probe, call-in, loops, aerial, video. "People" added.
Traffic Control	Signal preemption, changeable message signs.
Vehicles	GPS, Compass, Display, Two-way Radio.
Payment	No choice/comments recorded.
Traveler	"Phone" added.
Institutions	Public/Private and interjurisdictional. Jurisdictional problems, legal issues, and politics perceived as the largest problems that keep Southeast Michigan from effectively deploying a complete ESM system. Emergency Services Management is perceived as an infrastructure to support Mayday. Once the jurisdictional issues of Emergency Services **Management are solved, then the system effectively provides Mayday.**
Centers	Radio and dispatch.
Communications	**Microwave transceiver beacons. "Fiber" which can include "phone" added.**
Deployment Area	Entire Southeast Michigan region. ESM believed to be something that cannot operate out of one location. For it to work, it must be deployed throughout the whole **network and region.**

Commercial Vehicle Electronic Clearance

Subsystem	Choice/Comment
Surveillance	No choice/comments recorded.
Traffic Control	Weigh-in-motion.
Vehicles	Tags. "Truck office" added.
Payment	No choice/comments recorded.
Traveler	No choice/comments recorded.
Institutions	Public/private, interjurisdictional. Jurisdictional and standardization issues seen as the main problems between different governments and the trucking industry as barriers to full deployment.
Centers	Message composition.
Communications	Microwave transceiver.
Deployment Area	Major highways and borders in the Southeast Michigan region.

Mayday

Subsystem	Choice/Comment
Surveillance	No choice/comments recorded.
Traffic Control	No choice/comments recorded.
Vehicles	GPS, transmitter, two-way radio, cell phone.
Payment	User fee.
Traveler	No choice/comments recorded.
Institutions	Public/Private and interjurisdictional.
Centers	Dispatch.
Communications	No choice/comments recorded.
Deployment Area	Entire Southeast Michigan region.

Telecommunications & Electronics:

The Telecommunications & Electronics Perspective concentrated on two services. Their strategy was to develop a low-cost, quick deployment approach that makes use of as much existing infrastructure and equipment as possible.

Mayday

Subsystem	Choice/Comment
Surveillance	No choice/comments recorded.
Traffic Control	No choice/comments recorded.
Vehicles	GPS, two-way radio, cell phone.
Payment	Equipment purchases, 900 so users pay only when they need it.
Traveler	No choice/comments recorded.
Institutions	Public/Private.
Centers	Dispatch.
Communications	Cellular.
Deployment Area	Entire Southeast Michigan region.

En-route Driver Information (Private)

Subsystem	Choice/Comment
Surveillance	Call-in, loops, with aerial supplementing on “nice days.”
Traffic Control	No choice/comments recorded.
Vehicles	GPS, RBDS. GPS used to locate the vehicle so that the vehicle only receives information pertinent to its location.
Payment	Sponsorship, taxes, equipment purchase.
Traveler	No choice/comments recorded.
Institutions	No choice/comments recorded.
Centers	Radio, message composition.
Communications	No choice/comments recorded.
Deployment Area	Entire Southeast Michigan region.

Step 5 *. Perspectives Generate and Present Revised Strawman Deployment Plans

Objective: To provide a starting point for more incremental modifications of the Strawman Deployment Plan.

Process: The original Step 5 called for the facilitator team to take the participant-suggested modifications from Step 4 and, during lunch, use them to generate a Revised Strawman Deployment Plan, which would then be presented to the group. Since time constraints prevented the participants from suggesting modifications before lunch, this step was modified, and renamed Step 5*. The revision called for each perspective group to generate and present their own version of a Revised Strawman Deployment Plan that would take into account some of the issues of concern expressed by other perspectives. One other change from the original plan was that the change in focus, from a ten-year horizon to a two-year horizon, scheduled in Step 6 now took place here, in Step 5*. The change was to facilitate development of a response to the anticipated Model Deployment RFP, and included the addition of cost constraints.

Results: The participants took the general understanding of the issues and constraints surrounding ITS deployment that they acquired up to this point in the Seminar and applied it in developing a Strawman ITS Deployment Plan of their own.

Each perspective was invited to generate a plan to invest $20 million over the next two years in the way of strategic ITS Deployment in Southeast Michigan. The investment was to keep both longer term goals and the criteria for Model Deployment in mind. Participants were asked to assume that the funding was a one-time shot $10 million infusion from the Federal Government with $10 million matching requirement, so plans were to include types and sources of matching funding.

To help in the process, Bob Ervin briefly introduced a set of back-of-the-envelope estimates of what deployment of various services/ technologies would cost on a per area and per link basis. In this context, an area is a block of land, like the Sterling Heights, the Troy area, the Rochester area, the Orchard Lake Area, etc., where each of the areas are of roughly the same size. A “link” is a section of freeway between major points, where each link is of roughly the same length. The transparencies used during the costs discussion are provided in Appendix K.

The presentations made by the perspective groups are provided in the following pages. Only the Local Government and Telecommunications/Electronics Perspectives provided additional transparencies at this point and these are included in Appendix L.

Automobile Manufacturers

The Auto Makers Perspective discussed a number of issues, but did not state a succinct plan. They see a complete communications infrastructure as a priority. They feel there is a shortage of traveler information, and they would like to make this information available to their customers. They do not see themselves as providing communications expertise used to define standards in the field, though they are willing to provide already developed

communications technologies and other necessary equipment required on the vehicle side. There needs to be an external information source for the in-vehicle equipment to communication with.

Consumers

The Consumers Perspective discussed a number of issues, but did not state a succinct plan. They wanted to achieve complete deployment in a single area, and they felt the best place to start was in the area that is currently closest to 100% deployment. They wanted to automate the International Border Crossing procedure because so much money is being lost with the current system. Finally, they wanted to coordinate all ITS activities in Southeast Michigan under a group called SEMTC: Southeastern Michigan Transportation Consortium. Members would consist of MDOT, DDOT, Wayne, Oakland, Macomb, and any other involved organizations. SEMTC would concentrate on Research, Education and Outreach, which is a different focus than the laying of the physical infrastructure that other organizations such as SEMCOG have.

Interest Groups

The Interest Group Perspective discussed a number of issues, but did not state a succinct plan. They would like to see the $20 million used to develop an infrastructure on the main corridors as that will produce the maximum visibility, and visibility is key to garnering support from various sources such as the Auto Makers.

Federal & State

Given the nature of the forum, and the potential use of any information presented in crafting a response to the Model Deployment RFP, the Federal representative felt that publicly stating the Government's position in this forum would be inappropriate. Therefore, the Federal & State Perspective did not offer a model deployment plan or strategy.

Local Government

The strategy of the Local Government Perspective was to address their priorities of Throughput, Safety, and providing Pre-Trip information by providing instrumentation and signal coordination along the major arterial roads that are currently not instrumented within the Detroit Metropolitan area. They estimated the cost of this endeavor at $15 million and also pointed out that most of these roads are all under MDOT's jurisdiction. (An effort would be made to reduce the costs of the communications backbone, perhaps by using the 800 MHz system currently being implemented by the State of Michigan.) They believe it is important to service the major corridors of Wayne, Macomb, and Oakland counties, otherwise political problems will arise. The Local Government Perspective would also coordinate public transit service between DDOT and SMART by providing DDOT buses with AVL capabilities and some hooks to the SMART dispatch system for service connectivity at the service area boundaries. They estimated the cost of this effort at $1.2 million. The perspective also set aside $3.8 million for "systems integration" and to develop interfaces necessary to provide information.

Research

The Research Perspective felt that Model Deployment is all about political visibility, which requires keeping deployment moving forward, and they designed their plan based around this idea. They would deploy Emergency Services Management, deploy fiber on interstate rights-of-way and along arterial streets, use the state-wide microwave system currently being deployed by the State Police as a communications backbone, and deploy 500 limited range vehicular probes across the Detroit Metropolitan area. They note that the microwave system already being deployed would not only reduce the amount of new funds that need to be spent on developing a communications backbone, but would also allow the ITS infrastructure to tie in neatly with the National Information Infrastructure. Due to time constraints, the Research Perspective did not do a complete cost estimate. However, they did estimate the cost of the probes as $1000 - $2000 per installation, which would still leave money left over for other communication devices such as changeable message signs.

Telecommunications & Electronics

The Telecommunications & Electronics Perspective believes that it necessary to demonstrate ITS, and so they designed their Model Deployment plan around getting as many ITS-equipped vehicles out on the road as possible. They aim to deploy Mayday and Driver Information services. For Mayday, they would use a dispatch system and equip 4000 vehicles with GPS, modem, cellular phone, and other unspecified equipment at a cost of $1 million. Another 400 vehicles would be equipped with Driver Information by supplying Mayday boxes with GPS and sideband FM radio, and setting up RBDS at an FM station, for another $1 million. The plan anticipated development costs of about $400,000, including $200,000 of cost sharing. The plan also counts on the willingness of a major manufacturer to provide the dispatch system as cost sharing and the willingness of a major service provider to install the equipment as cost sharing.

Step 6*. Facilitator Generates a Consolidated Strawman Deployment Plan

Objective: To fine tune the Strawman Deployment Plan to maximize the net benefits.

Process: The original Step 6 called for the facilitator to moderate an open discussion concerning the Revised Strawman generated by the facilitator in the original Step 5. The intent was for participants to negotiate and decide on which modifications to adopt, resulting in a Consensus Strawman Deployment Plan. However, as a result of the alteration to Step 5, a series of Revised Strawman Deployment Plans, roughly one per perspective group, was available at this point. A preliminary discussion was held to generate a Consensus Strawman Deployment Plan out of the various perspective plans, but time did not allow for much progress. Thus, this work was, in most part, postponed and the facilitators attempted to craft a Consolidated Strawman Deployment Plan after the workshop was completed.

Results: A Consolidated ITS Strawman Deployment Plan made available for the perusal of all participants. The University of Michigan facilitator team emphasizes that the Consolidated Strawman provided here is 1)

based on our interpretations of the intentions of the Seminar participants and 2) incomplete, especially in the areas of funding sources and responsible parties. Moreover, we welcome any and all corrections, clarifications, and comments. We hope that this Strawman is received in the spirit in which it is intended: as a living document intended to stimulate creative dialogue.

In review, a major component of the ITS Deployment Exercise was a Strawman ITS Deployment Plan for Southeast Michigan. After the facilitator presented the Strawman, participants were invited to suggest modifications. That is, each stakeholder group was asked to draft their own deployment plan demonstrating how the Southeast Michigan transportation community should strategically use a limited amount of resources over the next couple of years to both accomplish longer term goals and meet the criteria for the upcoming U.S. DOT Model Deployment. These plans were to be limited to a budget of $20 million, the amount that could be expected from the Model Deployment. This $20 million was composed of $10 million from the U.S. DOT and $10 million in matching resources. Each plan was to include where the match would come from, what services would be deployed and where, and which ITS Subsystems would be utilized.

The draft deployment plans presented by each stakeholder group were reported in the preceding section. Based upon stakeholder-suggested modifications, and stakeholder interests as revealed through the ITS Services that they selected earlier in the day, a Consolidated ITS Deployment Strawman has been developed and is presented in this section. The goal of the Consolidated Strawman is to focus on the transportation customer: by providing more and better information to the traveling public, enhancing individual freedom of movement (including reducing delay due to incidents), improving traveling safety, and allowing for more productive commercial use of the transportation system.

The Consolidated Strawman includes ten of the eleven ITS Services described in the Exercise, the exception being Private Pre-Trip Traveler Information. Keep in mind that this Consolidated Strawman is with respect to the existing ITS deployments. Thus, for example, the main effort toward improving the service labeled Paratransit Operations Management is focused on institutional issues. This is not to say that other aspects of this service, such as Automated Dispatch, have been neglected. Rather, these aspects are currently being undertaken independent of the Strawman Plan. Each service included in the Consolidated Strawman is described in the following paragraphs in terms of the priority assigned to deploying the service, the action or method used to affect deployment, required input or cooperation, synergy that benefits other ITS services (it is assumed the service will benefit transportation customers), and cost and source of the funding. The sum total of the costs of all deployments in the Consolidated Strawman is $25 million dollars, $10 million of which could flow from the U.S. DOT Model Deployment funding to MDOT and through MDOT to local governments.

Public Pre-Trip Traveler Information

Priority

High

Action or Method

Integrate (both within and between the respective organizations) RCOC, MDOT, and interested private party traffic information (colored maps, etc. showing where congestion is) and provide on cableTV in Oakland County through agreement with TCI Cable. As a first step, provide the information on cable at the Chrysler Center so that employees can assess traffic conditions before they leave the workplace. Also provide the same information over the internet. This service can be expanded as new corridors come under surveillance.

Required Input or Cooperation

RCOC, MDOT, interested private party, Chrysler, and TCI Cable.

Synergy

Increases the value of surveillance efforts. Increases the value of the MDOT ATMS/ATIS expansion.

Cost & Source

$1.3 million. Free to end-customer. Paid by public-private partnership: both public and private parties provide information; private side provides transmission channel (cable, phone, internet, etc.) and is allowed to advertise over that channel. Similar in nature to the “weather channel.”

Public En-Route Driver Information

Priority

Medium

Action or Method

Incorporate the DIRECT project, which is currently studying various low-cost means to provide basic traffic information, including changeable message signs, cellular phones, LPHAR, and route-specific area-wide radio broadcast.

Required Input or Cooperation

Surveillance is needed to provide this service. Surveillance is included in the DIRECT Project, but integrating data from other sources could potentially improve the service.

Synergy

Information gathered will also benefit public pre-trip traveler information.

Cost & Source

$50,000. The DIRECT Project is currently funded by MDOT through the DIRECT Project, and is not included as cost sharing, though perhaps it could be.

Public Coordinated & Adaptive Signal Control

Priority

High

Action or Method

Provide traffic surveillance for the remaining uncovered major arterials in Oakland County, most of which are under MDOT jurisdiction. Install coordinated and adaptive signals along the newly included arterials. Work toward providing signal preemption capability for emergency service management and public transit. Seek to obtain access to a communications backbone at relatively low cost. Integration of external information, that is., information from non-traffic sensor sources such as incident reports, is not considered here.

Required Input or Cooperation

The aforementioned roads are under MDOT jurisdiction but affect traffic throughout Oakland County. Thus RCOC and MDOT must cooperate. Regarding the relatively low cost communications backbone, the public side must either 1) negotiate with private side for such service or 2) reach an agreement with the appropriate department to use the State of Michigan's 800 MHz microwave telecommunications system.

The surveillance function could potentially utilize probe information from ALI-Scout in the FAST-TRAC Operational Field Test. Similarly the signals could potentially provide traffic information to ALI-Scout. (These techniques are currently being considered as part of FAST-TRAC.)

Cost & Source

$15 million, which includes the surveillance infrastructure and the communications infrastructure (installation and ongoing costs). Roughly a fifty-fifty split between RCOC and MDOT with maybe some minimal level of private partnership for the communications infrastructure.

Public/Private Mayday

Priority

High

Action or Method

Deploy a mayday capability, in a limited fashion, across Southeast Michigan: 1) equip each of 4,000 participating vehicles with in-vehicle GPS, modem, and cellular phone, 2) establish a "900" telephone number to receive calls for help, 3) implement a system to provide a dispatch capability. Keep the system open for alternative means of determining vehicle location: LEO, Triangulation, milepost beacons. Begin an effort toward incorporating mayday into the existing publicly-backed 911 service to prevent proliferation of help numbers. (This would not in itself prevent charging for use.)

Required Cooperation

Public and private emergency services providers will respond to calls and so jurisdictional issues such as who responds to what mayday must be resolved.

Synergy

Emergency Services providers will operate more effectively if they receive more timely calls for help. Traffic information providers could benefit from better information on roadway incidents.

Cost & Source

$2 million to establish the system during initial deployment. A major equipment provider will provide the in-vehicle device at cost, that is, $250, which represents a direct cost of $1 million (4,000 units @ $250 each) and cost-sharing of $.25 million. A major manufacture will provide a dispatch system, which represents a cost-sharing of $0.5 million. A major service provider will install the in-vehicle communications equipment, which represents a cost-sharing of $0.25 million. (When the system is fully deployed it will generate revenue by charging users a $25 per call fee.)

Public/Private In-vehicle Signing/Real-Time Hazard Warning

Priority

High

Action or Method

Implement in-vehicle signing and hazard warning for a fleet of 400 vehicles in an area covering 100 miles of expressway and arterials. The in-vehicle functionality will be provided by a standardized microwave transceiver and audio/visual display. The roadside functionality will be provided by standardized microwave "milepost" beacons. In this simplest form of implementation, the beacons provide static information: speed limit, route/road name/number, next exit/cross street, services provided at next exit, etc. The beacon information could be updated at a later date to include dynamic information: road conditions, incidents, etc.

Required Cooperation

Collaboration on the part of the infrastructure providers and automobile manufacturers is required, both to develop system hardware and to integrate the vehicle and roadside systems.

Synergy

Only a receiver is needed for this service. The use of a transceiver, as indicated, provides a communication link to the roadside beacons that can also enable other services to the driver, such as mayday (although this function is provided differently in this Revised Strawman), stolen vehicle recovery, route guidance, yellow pages, and commercial vehicle electronic clearance. If the in-vehicle unit were implemented as a portable device, in combination with a pager for example, many alternate out-of-vehicle uses might also be available. A two-way system could also provide vehicle probe information: congestion levels could be inferred by the number of requests for information on a given section of road. The beacons could also provide vehicle location correction for "autonomous" route guidance systems.

Cost & Source

$1 million. Automobile manufacturers provide in-vehicle equipment, which represents cost sharing of $200,000 (400 vehicles @ $500 per vehicle). Systems supplier provides 100 beacons, which represents cost sharing of $100,000 (50 beacons @ $2,000 per beacon). MDOT and RCOC provide existing traffic information and bear the burden of $200,000 for the remaining 50 beacons. Integration costs for all participants of $500,000. Vehicles are volunteered by individuals and automobile companies, which represents cost sharing of $100,000.

Private Pre-Trip Traveler Information

Priority

Low

Action or Method

Left to the private sector.

Required Cooperation

Left to the private sector.

Synergy

Left to the private sector.

Cost & Source

Left to the private sector.

Private En-Route Driver Information

Priority

Medium

Action or Method

Take a low-cost, quick deployment approach to provide regional private en-route driver information: provide GPS in each vehicle and extract pertinent messages from a broadcast data stream on the basis of vehicle location. The system will be audio only (no visual) and use an FM side-band on RBDS. The system will not include a map database. In addition to in-vehicle equipment, implementation will require traffic surveillance, as well as someone to compose and code the messages, and place them in the radio data stream.

Required Cooperation

Traffic surveillance from public sources will be required. Cooperation on the part of an FM radio station will also be required.

Synergy

A single GPS device could be used for both this and the mayday function. Although a receiver will perform the basic function, transceiver could provide a number of other functions.

Cost & Source

$0.9 million. $150,000 for the GPS and side-band FM (400 vehicles @ $375 per vehicle for both, assuming the same vehicles as in the mayday deployment are used and that the GPS is that used for mayday, as described above). $400,000 in development costs. $330,000 for the message compilation function. $20,000 for FM station hardware and installation. initially, free access to a public FM station is assumed. After full deployment the service could be sponsored by advertisers and/or there could be per-**use fees or subscription fees.**

Private Route Guidance & Navigation

Priority

Low

Action or Method

Offer the capability of the “mile-post” beacons utilized for the In-Vehicle Signing service as a supplement to the existing efforts of the FAST-TRAC Operational Field Test and also as a location correction feature for existing private autonomous route guidance units.

Required Cooperation

Requires cooperation on the part of MDOT, RCOC, and participating route-guidance vendors.

Synergy

Makes use of the infrastructure provided for in-vehicle signing.

Cost & Source

$250,000 for system integration to be borne equally by MDOT, RCOC, and participating route-guidance vendors. The FAST-TRAC OFT is currently funded by MDOT and RCOC, and is not included as cost sharing, though it perhaps could be.

Public/Fleet Emergency Services Management

Priority

Medium

Action or Method

Use the State of Michigan's 800 MHz microwave telecommunications system to add region-wide two-way communications, including a mobile data terminal, to emergency vehicles. The addition of the mobile data terminal will necessitate upgrading dispatch center equipment as well. Integrate emergency response activity into traffic management systems (Adaptive Control and Ramp Metering) to divert people out of the incident area.

Required Cooperation

Interjurisdictional cooperation, especially between local/county police, State police, and emergency service providers, is key to success of this service enhancement.

Synergy

Knowledge of emergency response activity can enhance traffic management systems. The State's microwave system can be used by a number of services.

Cost & Source

$2.3 million. Source as yet unspecified.

Public/Fleet Paratransit Operations Management

Priority

High

Action or Method

Continue with the SMART ITS implementation. Coordinate DDOT and SMART services by equipping all DDOT buses with AVL capabilities and providing hooks to the SMART dispatch for service connectivity at the service area boundaries. Investigate using the State of Michigan's 800 MHz microwave telecommunications system.

Required Input or Cooperation

DDOT and SMART are obviously involved as are RCOC and MDOT. Other state agencies may be involved as well.

Synergy

The AVL-equipped buses can be used as probes to provide travel-time information for other information services and perhaps traffic management.

Cost & Source

$1.2 million. MDOT, RCOC, SMART, and DDOT will share the opportunity, and cost, of the SMART/DDOT coordination. The SMART ITS implementation is currently funded outside of the Revised Strawman, and is not included as cost sharing, though perhaps it could be.

Public/Fleet Commercial Vehicle Electronic Clearance

Priority

High

Action or Method

Set up a working group to pursue political authorization and private-side buy-in to provide electronic clearance for commercial vehicles using the international border crossing in Southeast Michigan. [Technologies to provide this service are currently available. However, several political issues must be addressed (see required cooperation).]

Required Input or Cooperation

First, technologies for this service are currently available, however, standards must be set. Second, agreements must be made between the national and state/provincial governments and the trucking companies as well.

Synergy

Commercial vehicles could provide a probe function for input to traffic information. The microwave transceiver could be developed in conjunction with the device to be used for in-vehicle safety and signing.

Cost & Source

Fee for service. A public or private, or cooperative public-private, venture could provide this service as an investment that would be recouped through user fees.

Overarching Institutional Issues

Priority

High

Action or Method

Create an overarching institution to coordinate all ITS activities in Southeast Michigan. Such an organization would consist of state, regional, and local transportation authorities. The institution would:

develop avenues to generate revenue for both private and public parties involved in transportation; one avenue might be integration and sale of diverse traffic information, determine the benefit that customers would receive from implementation of the Revised Strawman, communicate to the customer what they will get from ITS Deployment that they do **not** *have now, investigate modifying government procurement rules to more easily allow public-private partnering, investigate allowing installation of private fiber optic on public right-of-way, along expressways and arterial streets, in exchange for free or reduced-rate service.*

Required Input or Cooperation

Cooperation on the part of state, regional, and local transportation authorities is necessary. input from the private sector is essential.

Synergy

Increased cooperation among stakeholders in the transportation community would enhance most other efforts to deploy ITS.

Cost & Source

$1 million. Cost sharing, as appropriate, from the various transportation authorities.

Step 7. Facilitator Summarizes and Asks "What Comes Next?"

Objective: To briefly summarize the days events and connect the seminar to future activities.

Process: The facilitator brought the seminar to a close and invited comments from Kan Chen, who leads the effort to develop an ITS Strategic Plan for the State of Michigan, and Kunwar Rajendra, who represents MDOT on these matters. A "white paper" (this report) was promised to be written to summarize the day's results. The participants filled out a brief Deployment Workshop evaluation form.

Results: An understanding of how the results of the ITS Deployment Seminar will be used 1) in developing an ITS Deployment Plan for Southeast Michigan, perhaps for use in response to a U.S. DOT Model Deployment RFP and 2) in developing an ITS Strategic Plan for the State of Michigan.

Kan Chen, sharing insights learned through interviewing members of the ITS Michigan Board of Directors and through participating in the Deployment Exercise, presented four points to the group:

1) Outreach, not only in Southeast Michigan, but also *to* other parts of the State and to the various Stakeholder Groups, is essential.

2) ITS efforts must focus on the customer.

3) Mechanisms to generate revenue are needed: the International Border Crossing and MOTORCITI.

4) Success in pursuit of the Model Deployment funding requires capitalizing on Michigan's unique strength in the ITS area--the presence of the Big Four.

Kunwar Rajendra stated that the original intention was to use the ITS Deployment Exercise as input to the Strategic Plan for ITS for the State of Michigan. That purpose was quickly modified to include Model Deployment. He went on to say that Michigan has many strengths as a candidate for receiving Model Deployment funding, but that other areas have strengths too, so that those in Michigan should look at both strengths and weaknesses to improve Michigan's competitiveness. Dr. Rajendra went on to thank the participants for their time and input and stressed that the Exercise will help generate a better product for the whole State of Michigan.

Dr. Rajendra also stated that MDOT's plan is to have the ITS Strategic Plan completed sometime in May, with a draft available as an interim product. Moreover, he mentioned that a System Architecture forum might be held in Michigan sometime in February when a draft of the System Architecture recommendations is going to be released by the U.S. DOT. MDOT would like to be the first location at which the new information is release and also use the opportunity to present a draft of the Strategic Plan for Michigan.

A summary of the participant evaluation of the Deployment Exercise is in Appendix M. Many participants expressed the desire to see the Seminar run again so that they could complete a modified deployment plan, and then repeat the process with the modified plan as a new Strawman plan in order to further refine the plan. A transcription of the ITS Deployment Seminar is given in Appendix N.

Acknowledgments

We are obliged both to the government, corporate, and university representatives who volunteered to participate in the Deployment Exercise and to the UM and Kan Chen, Inc. personnel who volunteered to facilitate the event. We are also indebted to Bob Ervin and Chelsea White who provided input in development of the Schematic. Bob also provided the cost estimates used in the Exercise. We also thank Kan Chen for his help in providing the Michigan ITS Strategic Issues document used in developing the Exercise. A number of University of Michigan students also helped with testing of the Game and Seminar for which we are grateful. A debt of thanks is also owed to MDOT for funding the exercise and to the ITS Michigan Board of Directors for their support. Moreover, we give a special thank you to Cathy Seay-Ostrowski for her vital assistance in correspondence and arranging the facilities and refreshments for the workshop, and to Kathie Dunk for ably assisting Cathy in these tasks. Cathy also provided the transcription services.

Appendix A: Michigan ITS Strategic Planning Issues

2/5/96
Kan Chen

Michigan ITS Strategic Planning Issues

A. Organization

1. ITS Coordination

Comments

- Michigan has a lot of ITS experience, talents, and resources, but has been under-coordinated and under-funded for its potential accomplishments.
- Lack of effective cooperation within both the public and the private sectors has hindered Michigan's chance to accomplish its maximum ITS potential.
  The current focal point of ITS coordination at MDOT needs to be elevated to a much higher level in order to achieve effectiveness and efficiency of ITS decisions at the state level.
- Compared to other states (e.g., California and Minnesota), Michigan has not been well organized to achieve the cooperation of jurisdictional government units.
- Some ITS strategic plans of other states designate high-level officials (e.g., at the level of Transportation Commissioners in Virginia) to head up their ITS coordination.

Options

- Develop a statewide ITS program (a la GuideStar of MN).
- Strengthen SEMCOG (MPO) as a regional ITS program coordinator (a la MTC of Northern CA).
- Strengthen ITS Michigan as the statewide ITS Program coordinator (possibly with a dedicated staff).
- Elevate MDOT's ITS coordination to a much higher level in the organization.
- Other options and/or combination of the above.

2. Michigan ITS Summit

Comments

- The most important uniqueness of Michigan is the presence of the American automotive industry.
- However, in the eyes of the public, the top leaders of the automotive industry have not provided visible leadership and/or significant commitments to ITS.

- The top leader(s) of the Michigan State Government (including the Governor) have not exercised visible leadership and/or significant commitments to ITS.
- The lack of Michigan's top leaders' cooperation and commitments to ITS could be one of the most important underlying causes for the under-coordination and under-funding of the ITS activities in Michigan.
- We need a Michigan ITS Summit meeting (including the Governor and the Big 3 CEO's) to pronounce the high-level commitment to cooperation and support for Michigan ITS program activities.

Options

- Support a quiet Michigan ITS Summit meeting in the near future with the hope of a Summit-level pronouncement at the ITS Michigan annual meeting in May 1996.
- Develop a new major ITS thrust (see below) in the near future that would be exciting to the Governor and the Big 3 automakers with the hope that the new thrust would provide a basis for a successful Michigan ITS Summit some time in 1996.
- Do not plan on any Michigan ITS Summit until we get better ideas.
- Explore the possibility of getting USCAR involved in a significant ITS project as a prelude to the Michigan ITS Summit.

B. Thrusts

1. International Border Crossing

Comments

- International border crossings are where ITS/CVO technologies can produce tangible and significant savings to the truckers in the immediate future.
- Michigan is the state which either has the busiest truck traffic in international border crossings, or has the highest cargo value in such crossings, or both.
- A significant portion of the cargo on the trucks crossing international borders in Michigan is related to the Big 3 automakers' manufacturing processes.
- Reduction in delay time and uncertainties (related to toll collection, checking for immigration, customs and contrabands) are important to just-in-time deliveries for all manufacturers in Michigan and surrounding states.
- Michigan has been leading the country in operational tests and deployment of ITS-facilitated international border crossing.
- The benefits of ITS-facilitated international border crossing are expected to increase with time due to NAFTA.

- Similar but less tangible benefits also apply to passenger vehicles, and such benefits are likely to increase further due to the new casinos in Windsor, across the river from Detroit.
- The customs offices appear to be the most significant institutional barriers to the effective deployment of ITS-facilitated international border crossing services.
- Good intentions underlying ITS-facilitated international border crossing procedure can be defeated without the enthusiastic cooperation of individual custom officers.

Options

- Develop a revenue-generating public-private partnership to provide ITS-facilitated international border crossing services, including appropriate incentives for the involved customs offices.
- Deploy ITS-facilitated international border crossing services without charge , administered by the involved public agencies (continuation of the current trend of events).
- Other options and/or combination of the above (e.g., continuation of current deployment, followed by the creation of a public-private partnership at a later date.)

2. MOTORCITI

Comments

- MOTORCITI is a recent Michigan ITS initiative that will provide traffic information in Southeastern Michigan to private organizations which want to use the information to test various new ITS products and services, and/or to disseminate the information to ultimate users on a value-added basis.
- MOTORCITI is an entity created on the basis of a memo of understanding among MDOT, RCOC, and UM.
- A request for proposal is being prepared by MOTORCITI to attract ideas and specific proposals from the private sector.
- Whether MOTORCITI will be financially viable remains to be seen.
- Although MOTORCITI has the moral support of the Big 3 and other private firms in Michigan, these private firms are not likely to become partners to run MOTORCITI.
- MOTORCITI projects are likely to generate new jobs as well as new ITS services for Southeastern Michigan.

Options

- Develop MOTORCITI into a revenue-generating public-private partnership.
- Use MOTORCITI to get in-kind contributions from private organizations to support the ATMS/ATIS development in Southeastern Michigan, eventually involving additional public-

sector organizations to become members with financial stakes in the project.
- Other options and/or combination of the above (e.g., continuation of current deployment, followed by the creation of a revenue-generating public-private partnership at a later date.)

3. Tourism

Comments

- Tourism is the second largest employer (after automotive industry) in Michigan.
- Not much consideration has been given to the application of ITS to tourism in Michigan.
- There is significant tourism attracting tourists both internal and external to Michigan.
- There is probably more tourist traffic in the rural area than in the urban area.
- Michigan's tourist traffic flows probably more in the north-south direction than the east-west direction.
- ITS application for tourism will spread ITS services to a large portion of the state of Michigan.
- There is probably tourism data available from a number of Michigan sources.
- Developing ITS application to tourism as a major thrust may be a good way of connecting ITS to other significant programs (e.g., economic development), thus gaining wider and more high-level support for ITS in Michigan.
- It is possible that tourism in Michigan might be at least as great in the urban areas as in the rural areas.
- We need to involve AAA and Michigan Travel Bureau if we decide to apply ITS to tourism.
- Developing ITS application to tourism as a major thrust may be a dilution of ITS efforts from limited resources.

Options

- Develop ITS application for tourism as a major ITS thrust in Michigan, with a significant investment from MDOT and other interested state agencies.
- Develop ITS application for tourism as a possible ITS thrust in Michigan only if the thrust can become self-supporting in the near future (deriving revenue from such sources as advertising.)
- Postpone the idea of ITS application to tourism until a later date.
- Other options and/or combination of the above.

4. CVO/ATMIS integration

Comments

- ATMIS = ATMS + ATIS: e.g., MOTORCITI project.
- CVO deployment in Michigan includes Advantage-75 and international border crossing.
- ATMIS and CVO are both targets of early ITS deployment.
- Integration of ATMS and ATIS is an important pioneering effort in the FAST-TRAC project in Oakland County.
- At present, the thrusts of ATMIS and CVO in Southeastern Michigan are not closely linked as ATMIS is geographically focused on Oakland County, and CVO is geographically focused in Wayne County, and between Toledo and Detroit. Part of ATMIS also includes ITS-supported transit services (SMART).
- The integration of CVO and ATMIS is potentially synergistic (cost savings and functionally mutually supportive) but apparently is not emphasized anywhere in the U.S.
- Michigan offers an excellent opportunity to develop and demonstrate the integration of ATMIS and CVO.
- Some of the technologies involved in the Michigan ATMIS and CVO projects are not currently compatible (e.g., the Siemens infrared beacons for FAST-TRAC and the Hughes microwave beacons for Advantage-75 are not mutually compatible.)
- Integration of ATMIS and CVO in Southeastern Michigan will require the cooperation of Siemens, Hughes, and Rockwell which is doing the ATMS-ATIS integration for Oakland County.

options

- Initiate a new project to explore, and implement later if deemed feasible and desirable, the integration of ATMIS and CVO in Southeastern Michigan. (Funding may be obtained from federal as well as state/local sources.)
- Delay the consideration of ATMIS-CVO integration until the national system architecture is completed (by July 31, 1996).
- Do not consider ATMIS-CVO integration as a major ITS thrust.
- Other options and/or combination of the above.

5. Model Deployment

Comments

- Model Deployment (formerly known as Trailblazer) is a major federal initiative from the ITS Joint Program Office.
- The key elements of Model Deployment include the installation of core infrastructure and the demonstration of the emerging national ITS architecture.

- If Michigan becomes one of the (up to three) sites of Model Deployment, it will gain prestige, another impetus to coordinated ITS deployment, as well as considerable federal funding.
- ITS Michigan has met to discuss its serious interest in Model Deployment with the ITS Joint Program Office.
- Since then, the federal funding for Model Deployment has diminished from the originally proposed $100 million to perhaps $20 million in 1996. (If this is divided among three sites, the average of $7 million is a small fraction of the $100 million which Michigan has already invested in its ITS infrastructure.)
- If the objectives of Model Deployment are indeed worth pursuing for Michigan, then Michigan should develop a major thrust in this direction, with or without federal funding.
- Michigan has deep relationship with the two architecture teams (Loral and Rockwell) in Phase II of the System Architecture Program.
- However, the beacon approach to dynamic route guidance deployed in Oakland County may not be compatible with the emerging architecture, thus requiring adjustment for Michigan to be a logical site for demonstrating the national architecture.
- For security and other reasons, Detroit needs to recast its image as an attractive city for technology demonstration.

Options

- Continue the current pursuit for Model Deployment funding.
- Declare Michigan's intention to develop Model Deployment with or without federal funding.
- Make a strong claim to be a logical site for demonstrating the national architecture (especially after a plan is developed for the integration of ATMIS and CVO, involving Siemens, Hughes, and Rockwell.)
- Other options and/or combination of the above.

C. Development

1. Public-Private Partnerships

Comments

- It is widely acknowledged that public-private partnerships are essential for ITS deployment, for which about 80% of the resources are expected to come from the private sector.
- However, the U.S. has little experience in public-private partnerships, which are not even clearly defined (e.g., partnerships may or may not be legal entities, and may or may not generate revenues and profits.)

- The most visible ITS public-private partnership is ITS AMERICA, (and ITS Michigan within the state of Michigan), which has provided a one-stop institutional arrangement for public-private exchange of ideas and information in ITS. but does not plan to market specific ITS services.
- However, all involved parties want to see more action-oriented public-private partnerships beyond what has been represented so far by ITS AMERICA.
- There are serious private-sector concerns regarding the lack of substantial and continuing public-sector support for ITS.
- A number of private ITS product and service providers would like to have long-term relations with public agencies responsible for ITS deployment that is analogous to the close long-term relations between automobile OEM's and their suppliers.
- Michigan as a state needs to strengthen its reputation for being conducive to private companies doing business here.
- MDOT has demonstrated its innovativeness in having given its first "design and build" contract to Rockwell recently for instrumenting 180 miles of the Michigan freeways.
- TACOM, with its National Automotive Center, has demonstrated the unique opportunity for Michigan to provide two-way technological transfer of automotive knowledge between the defense and civilian sectors.
- It is not clear whether public agencies such as MDOT and RCOC are legally allowed to generate revenue and/or profit, how such profit could/should be used, and whether their staffs fully understand how to serve on revenue/profit generating partnerships.
- It is not clear whether private companies are interested in entering into revenue/profit generating partnerships with public agencies given the private sector's general belief in the bureaucratic behavior of public agencies.
- It is not clear whether certain segment of the private sector (e.g., the Big 3 automakers) are interested in joining those public-private partnerships which can generate revenue/profit in the foreseeable future.
- It seems that brainstorming workshops and gaming simulation may be an effective way to explore the realistic interests, and the rules/conditions under which such interests would be served for various ITS public-private partnerships.

Options

- Explore possibilities and legal implications for Michigan public authorities to develop long-term relationship with selected private firms for continuing ITS services in the same manner that

automotive OEM's have developed long-term relationships with selected automotive suppliers.

- Explore possibilities and legal implications for Michigan public authorities to negotiate quid pro quo with private companies (e.g., granting right of way to communication companies in exchange for free use of communication capacities.)
- Obtain answers to all the legal questions mentioned above.
- Hold brainstorming workshops and gaming simulation for ITS public-private partnerships in Michigan.
- Consider state public policies of providing incentives for private companies to enter into ITS public-private partnerships in Michigan (e.g., Michigan State to establish a revolving fund for low-interest loan and/or to grant state tax holidays to private companies entering into such partnerships.)
- Other options and/or combination of the above.

2. Public-Public Partnerships

Comments

- Effective cooperation among Michigan public authorities is needed for early ITS development in Michigan.
- Metropolitan Planning Organizations (MPO's), while elevated by the legislation of ISTEA, for historical and other reasons, have not played any predominant role in Michigan ITS development.
- It is generally acknowledged that some other states, notably Minnesota and Southern California, have done particularly well in public agency cooperation in ITS.
- The increased cooperation between MDOT and RCOC in recent years, as well as the cooperation among public agencies for Michigan freeway incident management (Blueprint for Action), have signaled a new phase of positive public agency cooperation in Southeastern Michigan for ITS.
- TACOM, with its National Automotive Center, has the potential of attracting more federal funding on ITS-related activities, not only from DOD, but also from other agencies, including DOC (National Information Infrastructure), DOE (hazardous materials tracking and routing), NASA (rovers), as well as DOT (ITS Joint Program Office).
- A public-public partnership in ITS has already developed in Michigan, involving MDOT, RCOC, and UM in the MOTORCITI project.
- ITS-facilitated international border crossing may develop into another public-public partnership in Michigan, including the Immigration and Naturalization Service, and the Customs Office, on both sides of the border.

- Michigan has been a participant, though a relatively passive one, in the Enterprise Program, which is a partnership among a number of states to explore and foster ITS applications at the state and local levels.
- It seems that brainstorming workshops and gaming simulation may be used also to explore the realistic interests, and the rules/conditions under which such interests would exist, for various ITS public-public partnerships.

Options

- Study carefully how Minnesota developed its public-public partnership in the GuideStar Program.
- Explore possible new arrangements that would involve wider participation and closer coordination of public agencies in Michigan that need to work together for effective ITS deployment.
- Explore possible new arrangements that would involve wider participation and closer coordination of federal agencies with relevant ITS-related experience, utilizing the unique strengths of Michigan and using Michigan as possible test beds (see below for more ideas on test beds.)
- Hold brainstorming workshops and gaming simulation for ITS public-public partnerships in Michigan.
- Other options and/or combination of the above.

3. Infrastructure-Supported AVCS

Comments

- Michigan's most unique strength is the presence of the automotive industry.
- Yet the automotive OEM's have not made the kind of major commitments to ITS as many had anticipated.
- ATMIS and CVO, the early targets of ITS deployment, are not in the core business of the Big 3.
- The Big 3 have observed Michigan's early ITS major thrusts (international border crossing and MOTORCITI) with interest more as potential users rather than as enthusiastic investors.
- Advanced Vehicle Control Systems (AVCS) are technologies in the core business of automakers, which have their own internal competence to develop in a worldwide competitive environment.
- Automotive electronics have progressed from the stage of isolated devices (e.g., fuel injection), to the stage of subsystems (e.g., anti-lock braking system), and to the stage of integrated systems (e.g., power train control). The logical next stage is to include sensors and information on the road infrastructure as a part of integrated automotive electronic system.

- Infrastructure-supported AVCS for safety and comfort has the potential advantages over autonomous AVCS in terms of technical feasibility, human factor consideration, and total costs.
- Automated Highway Systems (AHS), depending on the particular concept to be deployed, can be a form of infrastructure-supported AVCS. However, AHS' goal of complete driving automation makes AHS a distant goal, which does not have the enthusiastic support of all automakers.
- There are many possible infrastructure-supported AVCS that can be realistic near-term goals that would be supportable by practically all automakers.
- The development and testing of these near-term infrastructure-supported AVCS can naturally be a major ITS thrust for Michigan.
- While this category of infrastructure-supported AVCS has been represented by a couple of UM/RCE projects, its full potential has not been explored jointly by the most visionary and experienced vehicle designers and highway designers.
- Some of the research projects within the Japanese vehicle manufacturers and road research institutes are in this category of infrastructure-supported AVCS.
- Selected individuals in MDOT, RCOC, and the "Big 4" (the Big 3 plus TACOM) have suggested ideas in this category of research but have not interacted with one another to explore synergistic cooperation.

Options

- Collect individual ideas from "the Big 4," the UM/RCE CAB members, and other universities about infrastructure-supported AVCS.
- Hold a brainstorming workshop to develop ideas and a possible work plan for infrastructure-supported AVCS — a better term might be Infrastructure-Supported Advanced Automotive Control (ISAAC).
- Develop ISAAC as a major ITS thrust for Michigan, including research, development, and operational testing, utilizing the unique strengths of Michigan and using Michigan as possible test beds (see below for more ideas on test beds.)
- Consider various ways to relate ISAAC to AHS.
- Other options and/or combination of the above.

4. Access to Available Traffic Information

Comments

- Southeastern Michigan has already installed a great deal of core infrastructure to collect traffic information.

- While not all the traffic information in Southeastern Michigan is available, much of the available information is useful to a large number of potential users (both drivers and transit passengers), or at least useful for demonstration purposes.
- At present, most if not all the available traffic information has not been disseminated to the potential users or to the general public in Michigan.
- A few states and localities (e.g., Seattle, Los Angeles) have already begun dissemination of their traffic information without devices that are costly to individual travelers (e.g., via kiosks, internet, CMS, etc.).
- Some private-sector people have urged Michigan public authorities to disseminate their traffic information as a few other states and localities have done.

Options

- Find out what and how other states and localities have done in traffic information collection and dissemination.
- Find out what selected potential users (including service providers) want to see in the near future in terms of Michigan traffic information dissemination.
- Design and implement selected low-cost means of traffic information dissemination on a high-priority basis.
- Use customized traffic information dissemination as a quid pro quo for private sector implementation of ATIS in Michigan.
- Coordinate this last action with the MOTORCITI project.

5. Development of New Traffic Information

Comments

- ITS has the potential of collecting new forms of traffic information (e.g., origin-destination, vehicle types in the traffic, and road surface conditions).
- These new forms of traffic information have value to both public and private sectors for planning purposes.
- Several operational tests in the U.S. are involved in assessing the methods, costs, and benefits of these new forms of traffic information.
- The processing and marketing of these new forms of traffic information can be the basis of new ATIS business.

Options

- Find out what and how new forms of traffic information are collected, processed, and disseminated in relevant operational tests.

- Use MOTORCITI as a vehicle for exploring and fostering the development and dissemination of new forms of traffic information.
- Other options for developing and marketing new forms of traffic information.

6. Michigan as a Priority Corridor

Comments

- A great deal of federal ITS funding has been concentrated on the four Priority Corridors designated in ISTEA (Eastern Seaboard, Lake Michigan Coast around Chicago, Houston, and San Diego to Los Angeles.)
- Michigan is not a part of the current Priority Corridors and has not been eligible for Priority Corridor funding.
- Michigan should try to be designated as a Priority Corridor in the next legislation for ITS.

Options

- Develop a new set of criteria for future Priority Corridors that would favor Michigan without generating a great deal of new competition.
- Work with the Michigan delegation to Congress on the designation of Michigan as a future ITS Priority Corridor.
- Combine this effort with other efforts in the ITS strategic plan.

7. New Test Sites in Michigan

Comments

- The Big 4 have significant vehicle test sites in Michigan.
- Michigan has been the sites of several major ITS operational tests (including FAST-TRAC, DIRECT, SMART, Advantage-75, and international border crossings.)
- Michigan is not currently a backup test site for AHS.
- US 23 expressway and I-94 rehab planning will be good opportunities for these two expressways to be planned as possible future test sites for AHS and/or ISAAC.

Options

- Develop the concept of Michigan becoming the major test site for ISAAC (see previous discussion on ISAAC.)
- Develop the concept of utilizing all Michigan test sites in connection with new major ITS training programs (see more discussion on training programs below).
- Other options and/or combination of the above.

D. Improvement

1. Funding Development

Comments

- Most of ITS federal funding coming to Michigan has been through Congressional earmarking.
- Michigan is not receiving nearly the same level of earmarking from the new Congress as in the past.
- Michigan should become more independent of ITS federal funding.
- State/local funding has been, and will continue to be, scarce and will be hard pressed due to other transportation needs.
- The possibility of an increase of Michigan state gasoline tax has become very dim in the foreseeable future.
- The ITS stakeholder groups do not have a clear picture of all the categories and magnitudes of federal funds available to ITS deployment (in addition to ITS-designated funds.)
- Private sector funding can become available only if the return to investment is competitive and relatively risk-free. Private support can include (and has included) both cash and in-kind contribution to ITS programs and projects.
- As mentioned previously, TACOM, with its National Automotive Center, has the potential of attracting more federal funding on ITS-related activities, not only from DOD, but also from other agencies, including DOC (National Information Infrastructure), DOE (hazardous materials tracking and routing), NASA (rovers), as well as DOT (ITS Joint Program Office).

Options

- Determine what ITS services from which Michigan can benefit the most.
- Hold a workshop to inform various stakeholders about funding categories and options.
- Develop an infrastructure funding approach relying mostly on state/local sources (including non-ITS federal funds) on the basis of maximum benefits to Michigan.
- Use federal funding mainly to accelerate, not to enable, the ITS infrastructure implementation.
- Develop a concerted effort (involving the Big 4 and other Michigan ITS members) to attract increased ITS research funding from multiple federal agencies Including DOT, DOD, DOC, DOE, and NASA.)
- Develop a plan for attracting private funding (including special incentives such as a revolving fund for low-interest loans) for the high-priority ITS services that Michigan can benefit the most.

- Develop a plan for the use of increased state gasoline tax (if and when it becomes available) for deployment of ITS services needed by the general public in Michigan.
- Other options and/or combination of the above.

2. Funding Distribution

Comments

- Distribution of federal highway funds among state and local agencies has been a source of contention among the agencies.
- The capabilities of local agencies to fund ITS deployment are very uneven, making it problematical to deploy optimal regional ITS.
- ITS operational tests in Michigan have concentrated on a few urban locations.
- Other states (e.g., Minnesota, Virginia, and Washington), have ITS applications in both urban and rural areas.
- Isolated application of ITS may lead to Balkanization of ITS deployment in Michigan.
- Optimal ITS deployment may mean an appropriate timing spread of ITS implementation from a few "growth poles" to the rest of the state.
- ITS application to tourism, especially if it can become partially self-supporting, would be a very good way to accomplish rapid spread of ITS implementation to many parts of Michigan.

Options

- Develop a regional mechanism (MPO or otherwise) to deal with distributional issues in ITS funding within Southeastern Michigan.
- Develop a statewide mechanism (led by MDOT) to deal with distributional issues in ITS funding throughout Michigan.
- Widen the geographical and institutional representation in ITS Michigan.
- Develop a plan for ITS application for congestion relief in the Grand Rapids area in the western part of Michigan.
- Develop a plan for ITS application to Michigan tourism.
- Other options and/or combination of the above.

3. Relevant Research

Comments

- The UM/RCE is a national ITS asset and a major strength in Michigan ITS capabilities.
- While the UM/RCE has been doing excellent long-term research, the outputs do not match the needs and interests of many of its state/local and private sponsors.

- The list of UM/RCE projects for the sponsors' votes every year does not include projects that would closely match the needs and interests of many of its state/local and private sponsors.
- Some of the state/local and private sponsors of UM/RCE did not understand the multi-year commitments to most of the Center's projects, and find it problematical to switch their support toward research that would match their shifting needs.
- The research capabilities of other Michigan state universities can also be better matched to the ITS needs of the state (e.g., Michigan Tech's Technology Transfer program can be better matched to the needs for spreading ITS applications throughout the state.)

Options

- Involve UM/RCE in the development of a new slate of research proposals that would better match the ITS strategic needs of Michigan (e.g., see the description of ISAAC above)
- Consider strategic roles for other Michigan state universities (MSU, WSU, and Michigan Tech) and research institutes (e.g., ERIM) on the basis of the Michigan ITS Strategic Plan under development.
- Other options and/or combination of the above.

E. Planning

1. Who Else to be Involved

Comments

- The 1 st round of interviewees for the Michigan ITS strategic plan development are mostly those members on the Board of ITS Michigan who are very experienced in ITS.
- All the 1 st round interviewees (12 people) have been invited, along with others, to an ITS Deployment Exercise (including a total of 21 participants) at UM/RCE held on December 7-8,1995 for group discussion and interaction.
- The progress of the strategic plan development has been presented to the MDOT directors at a briefing on December 21, 1995.
- For the sake of quality and acceptance of the strategic plan, the process must involve all the major stakeholders in Michigan.
- With limited time and resources, it is not clear who else should be directly involved in the planning process between now and May, 1996 when the plan should be completed.
- Extensive involvement of stakeholders would require additional staff time and effort, which may have to come from outside the current contract on a voluntary basis.

Options

- As a minimum, all the members of the ITS Michigan Board should be involved.
- Ask the Board to identify and prioritize additional individuals/groups to be interviewed or briefed about the evolving strategic plan.
- Successive briefings and meetings, involving more people as time goes on, can be held at various locations of the state.
- Each of these meetings can include breakout groups to discuss various issues and topics, and the breakout group leaders and recorders can help, on a voluntary basis, draft the conclusions as inputs to the planning process.
- Other options and combination of the above.

2. Linkage to Other Programs

Comments

- Since ITS is only a part of the transportation system, the ITS strategic plan must be linked to the Michigan Transportation Plan.
- Since transportation is a part of the total infrastructure to support many functions of the society, the ITS strategic plan should be linked to other state/local programs that may be synergistic (mutually supportive) with ITS.
- JHK has produced a draft handbook for ITS planning, which provides advice on how ITS planning could be couched in the context of state transportation planning.
- Linking ITS to other high-priority state/local programs would attract the attention of high-level leaders and the general public, thus enhancing the chance of getting their needed support for ITS.
- Among the high-priority state/local programs are the economic development program at the state level (e.g., possible link through ITS application to tourism), and the Detroit Marketing Plan at the city level (e.g., possible link through ITS application to traveler security.)
- Appropriate linkage to the high-priority state/local programs may be helpful to the planning for a Michigan ITS Summit meeting (see previous discussion on the ITS Summit above).

Options

- Ask the participants of the ITS Deployment Exercise to help identify all high-level Michigan programs that could be enhanced by ITS.
- Review selected programs to identify and ascertain genuine ITS linkage.

- Involve appropriate leader/staff of selected state/local programs in the ITS strategic planning process.
- Other options and combination of the above.

F. Education/Outreach

1. Training Current Staff

Comments

- The sizes of MDOT and RCOC staff with ITS skills are rather limited, and this problem is even more serious with other public agencies in Michigan.
- Skilled staff is needed not only in design and construction but also in maintenance and operation of ITS; also needed to evaluate and monitor external ITS contractors.
- Staff with ITS skills in the private firms in Michigan is also hard to maintain if the firms cannot count on a long-term relationship with the state/local agencies needing their service.
- Training for the practical skills in ITS is not matched by the high-level educational program offered by research universities.
- On-the-job training, continuing education, community college and high school training programs should also be considered.

Options

- Hold a workshop to discuss specific training needs for current ITS staff in both the public and private sectors of Michigan, and their recent experience in training successes and problems.
- Develop a practical training program that includes various options for training current staff in both public and private sectors.

2. Training Future Staff

Comments

- The field of ITS is new and still evolving rapidly,
- The field of ITS is highly interdisciplinary.
- To be able to adapt to future technological changes, the future ITS staff must have solid backgrounds in basic scientific and technical knowledge.
- Many of the research university programs are strong in theoretical curricula but lack (or do not require enough) laboratory courses (and facilities) to train ITS engineers of the future.
- Michigan has the highest concentration of advanced vehicle testing facilities and proving grounds in the country.
- Michigan is the site of multiple significant ITS operational tests.

- UM students have won many competitions in vehicle design (e.g., solar car races) over the years.
- Michigan can become the world's foremost training ground for future ITS technical staff.
- UM is on the verge of launching a new interdisciplinary educational program in Transportation Engineering.

Options

- Develop a vision for training future ITS technical staff.
- Develop an action plan that will take advantage of the unique strengths of Michigan for training future ITS staff.

3. Educating the Public

Comments

- The field of ITS is new and still not well understood by the public.
- Even employees of the automotive industry do not fully understand ITS.
- The successful implementation of ITS will require the acceptance and support (including willingness to vote and willingness to pay) for ITS infrastructure and services.
- The Michigan ITS strategic plan must have the understanding and support of the general public for its implementation and future updating.
- Both the ITS Joint Program Office and ITS AMERICA have ITS outreach programs aimed at the education of the public, including public officials at the state/local level.
- Outreach activities can include public meetings, brochures, publicity through the media, museum exhibits, ITS technology shows at various occasions, information access (including real-time traffic conditions) through kiosks and computer terminals, and regular exhibits at meetings and at the lobby of various supporting organizations (the Big 4, MITS, Oakland Traffic Management Center, UM/RCE lobby, AAA offices, truck stops, etc.)
- Outreach is an important function that needs comprehensive planning and concerted actions of multiple organizations, and cannot succeed through haphazard efforts.

Options

- Hold a workshop on ITS outreach in conjunction with the strategic planning process.
- Develop a comprehensive plan for Michigan ITS outreach (to major stakeholder groups and to the general public) that would take advantage of the outreach program materials and activities of ITS AMERICA and ITS Joint Program Office.

- Use appropriate linkage between ITS and other state/local programs as a way to educate high-level leaders about ITS (see previous discussion on “linkage to other programs” above).
- Use the 1 st Michigan ITS annual meeting in May 1996 to kickoff the Michigan ITS outreach program.
- Other options and combination of the above.

Appendix B: List of Exercise Attendees

Participants

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Appendix C: Transparencies Used in the Introductory Session

ITS Deployment Exercise

Workshop for Exploring ITS Deployment Scenarios

University of Michigan

Pre-Exercise Checklist

- Meal tickets in front of them
- Roadmap
- Agendas

Food for thought.....

- How will ATIS and ATMS be deployed in SE Michigan 10 years from now?
- What sort of infrastructure will be deployed? How can it be sustained?
- Who will own, operate, and maintain the infrastructure and equipment?
- How much will it cost?
- What are the benefits?

Agenda

- **Day 1: Thursday Evening (6:30-10:30)**
  - **Introduction and Overview**
    - Chip White
    - Steve Underwood
    - Richard Duke
  - **ITS Deployment Game (other side of room)**
    - Richard Duke (Game Overal Director)
  - **Debriefing**
- **Day 2: Friday (8:30 - 5:00), Ford Library**
  - **Introduction and Overview**
  - **ITS Deployment Seminar**
    - Steve Underwood
  - **Summary/ Synthesis**
    - Kan Chen & Tom Reed - Strategic Planning
    - Kunwar Rajendra - Whats next?

Credits

- **Designers**
  - Steve Underwood
  - Richard Duke
  - Mark Lebay (also graphics)
  - Lisa Leutheuser
  - Tom Reed
- **Advisors**
  - Bob Ervin
  - Chip White
  - Kan Chen
- **Arrangements**
  - Cathy Seay-Ostrowski

Perspective Facilitators

- Kan Chen (Automotive)
- Harriet Chen (Consumers)
- Bob Ervin (Telecomunication)
- Tom Reed (Federal & State Govt.)
- Zakia Shaikh (Local Govt.)
- Becky Richeson (Researchers)
- Richard Wallace (Interest Groups)

Role Assignments (Seminar)

- **Auto Makers**
  - Ivy Renga
  - Ed Greene
  - Gerry Conover
- **Federal & State Government**
  - Martin Monohan
  - Kunwar Rajendra
  - Jim Bolger
- **Consumers**
  - Mac Lister
  - Paul Lesco
  - Morrie Hoevel
- **Local Government**
  - Brent Bair
  - Jim Barbaresso
  - Albert Martin
- **Telecommunications/ Electronics**
  - Tom Wissing
  - Jay Abel
  - Mel Rhode
- **Researchers**
  - Oscar Villalvazo
  - Chip White
  - Don Orne
- **Interest Groups**
  - Greg Cook
  - Russ Gronovelt
  - Joe Saul

Role Assignments (Game)

- **Auto Makers**
  - Ivy Renga
  - Kunwar Rajendra
  - Oscar Villalvazo
- **Federal & State Government**
  - Martin Monohan
  - Ed Greene
  - Jim Bolger
- **Consumers**
  - Mac Lister
  - Mel Rhode
  - Morrie Hoevel
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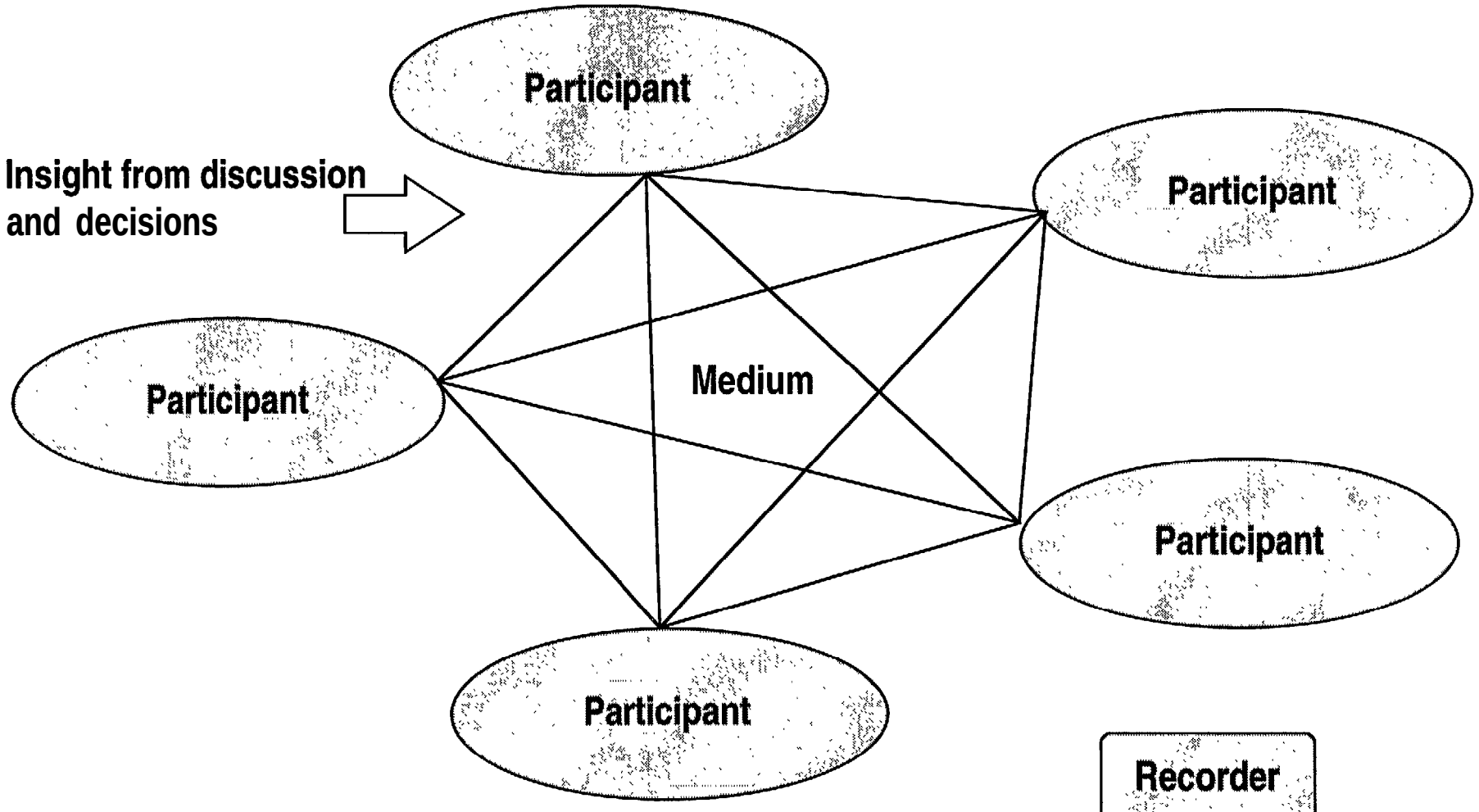
  - Jim Barbaresso
- **Researchers**
  - Chip White
  - Don Orne
  - Greg Cook
- **Interest Groups**
  - Russ Gronovelt
  - Joe Saul
  - Gerry Conover

Logistics

- Location
  - **Thursday: Holiday Inn**
  - **Friday: Gerald Ford Library**
- Parking
  - **Ford Library Parking lot is not intuitive**
  - **Across the street, see your map**
  - **See Cathy for parking stickers**
- Breakfast
  - **7:00 at Holiday Inn**
  - **8:00 at Ford Library**
- Telephones
  - **Restrict to breaks**
- Departure
  - **Stay till the end**

Philosophy: Emphasis on Communication!



Desired Products

- Exchange of ideas on ITS deployment in SE Michigan
  - Deployment alternatives
    - **Services**
    - **Infrastructure**
  - Roles of various organizations
  - Coordination and cooperation
- **Recording of ideas**
  - Report on workshop
  - Michigan Strategic Plan
  - Model Deployment

Core Planning Tools

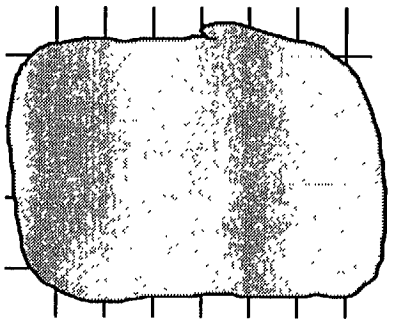
System Design

SUBSYSTEMS

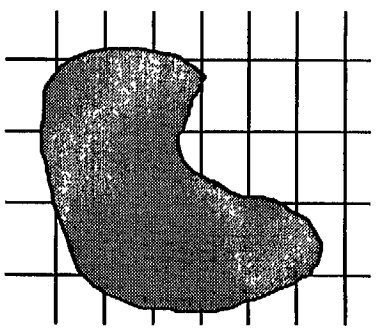
SERVICES		surveillance		roadside
Traffic info		X		+
Route Guidance		X		

Service Coverage

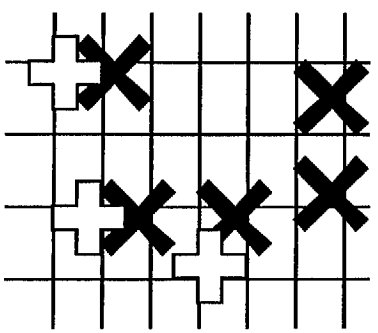
Route Guidance



Traffic Information



Infrastructure Deployment



Elements of a Deployment Plan

- Roles
- Services
- Subsystems/Architecture Elements
- Services x Subsystems Design
- Equipment
- Infrastructure
- Geographic Distribution
- Costs & Benefits Allocation
- Institutional Arrangements
- Standards*
- Timing
- Synthesis

*Not explicitly addressed

Seminar Agenda

1. Introduction and Overview
2. Evaluate Your Potential Benefits
3. Introduce Strawman Deployment Plan
- BREAK
4. Modify Strawman System Design and Service Coverage Plan
- LUNCH
5. Present Revised System Design and Service Coverage Plan
6. Modify Infrastructure Deployment Plan
- BREAK
7. Consensus Deployment Plan

1. Introduction and Overview

- Seminar objectives
  - **Promote effective communication about complicated systems from perspectives of various interest groups (dialogue is the key)**
  - **Take a whole systems approach**
- Tools to stimulate systems approach
  - **Service-Subsystem Matrix**
  - **Value diagrams: Perspective preferences**
- Products
  - **Improved communication among participants**
  - **Initial "first pass" deployment plan**
  - **Ideas recorded**
- Introductory tasks
  - **Role and perspective assignments**
  - **Introductions for the microphone**
  - **Seminar overview**
  - **Answer questions**

2. Specify Your Potential Benefits

- Objective
  - **Establish motivating forces for each perspective, and compare for differences and similarities among the perspectives**
- Process
  - **Discuss your perspective and identify potential benefits your organization are seeking from ITS services**
  - **Use benefits listing to stimulate thinking**
  - **Translate potential benefits and their relative value to pie charts. Identify which products and services are most likely to produce these benefits.**
  - **Representatives from each group explain perspective pie charts in roundrobin discussion**
- Results (for each perspective group)
  - **Evaluation and comparison of expected/desired benefits from each perspective group**

3. Introduce Strawman Deployment Plan

- **Objective**
  - Demonstrate how the deployment planning framework is used
  - Provide a point of departure for discussion
- **Process**
  - Facilitator presentation
  - Questions and answers
- **Results**
  - General understanding of the deployment planning framework

4. Modify Strawman System Design and Service Coverage Plan

- Objectives
  - **Identify highest priority services**
  - **Establish general designs for selected services**
  - **Plan service coverage**
- Process
  - **Each perspective group selects 3 to 5 priority services to deploy (i.e., overheads)**
  - **Select strawman equipment & infrastructure on overheads (keep costs constant)**
  - **Indicate service coverage by coloring circles (costs constant)**
  - **Representatives present revised plan (roundrobin)**
- Results (for each perspective group)
  - **Priority services for each group**
  - **Modifications for strawman service design**
  - **Service coverage area**
  - **Input to synthesis**

Presentations of Revisions

- Identify services
- Changes in infrastructure & equipment
- Changes in service area
- Tie to benefits pies
- Net cost of modifications by service

Assumptions

- 10 year planning horizon
- SE Michigan
- Fixed costs

Lunch - Facilitators Meeting

- Objectives
  - **Try not to panic!**
  - **Develop a synthesis plan to start general discussions**
- Process
  - **Facilitators collect system designs and service coverage maps from perspective tables**
  - **All facilitators meet at the wall charts**
  - **Each facilitator reports on important recommended changes from their group. These are listed on flip chart.**
  - **We rank in order based on priority, feasibilty, and cost**
  - **On the wallcharts we modify (1) matrix, (2) service coverage, and (3) adjust costs. We also make adjustments to the infrastructure map.**
  - **Outline justification for changes and omissions**
- Result
  - **Synthesized system design matrix, service coverage, costs, and first crack at infrastructure charts**

5. Present Synthesized System Design and Service Coverage Plan

- Objective
  - To provide a starting point for more incremental modifications of the charts
- Process
  - Facilitators present synthesized system design matrix, service coverage plan
  - Questions and answers for clarification
  - Break and review diagrams
  - Round-robin reactions
- Results
  - Synthesized system design and service coverage

6. Modify Infrastructure Deployment Plan

- Objective
  - > To fine tune the infrastructure and maximize the net benefits
- Process
  - > Open discussion
  - > Make modifications in infrastructure plan (holding costs constant)
  - > List proposals on flip chart, objections?
  - > Implement on diagrams
- Results
  - > Improved infrastructure plan

7. Summary and Next Steps

- Objective
  - Connect to other activities
- Process
  - Kan Chen & Tom Reed - Remarks and summary
  - Kunwar Rajendra - Next steps
  - Close, evaluation
- Results
  - Information to be recorded in white paper

Appendix D: Description of Perspectives and Roles Played in the Game

Auto Makers Perspective

The Auto Maker Perspective represents the interests of the "Big Three" auto makers. Their interests include competing with foreign and domestic auto manufacturers to make profit. As more and more cars flood the roadways every year, ITS may provide new approaches to handling road transportation. The development costs are high, but there are potentially large future payoffs as the customers begin to demand ITS technologies in their cars.

The specific roles within the Auto Makers perspective are:

Company A-This person represents the interests of a large American auto maker.

Company B-This person represents the interests of a large American auto maker.

Company C-This person represents the interests of a large American auto maker.

Consumer Perspective

The Consumer Perspective represents the transportation needs of private citizens and other groups that are consumers of ITS technologies. They address issues that are of concern to the users of ITS services and technologies. The three roles in the Consumers perspective are:

Commercial Vehicle-This person represents companies that make use of fleets of commercial vehicles, such as commercial trucking. Trucking include those who make daily runs within a local geographical area and those who drive across the country to deliver their goods. They make extensive use of the highways. Their interests include fast and efficient highways, increased highway safety, and easy highway access, as well as, tracking and incident response.

Private Traveler-The private traveler is the average individual who uses the roadways on a more or less daily basis. These people include daily commuters who may spend an hour or more driving each day as well as the homemaker who may need to run errands and shop during the day. This person represents the interests of people who use the roadways on a daily basis. These people include daily commuters who may spend an hour or more driving each day as well as the homemaker who may need to run errands and shop during the day. They are interested in reducing travel time and stress, and may have some concerns about personal safety as well as and noise control, especially when busy highways run next to their subdivisions.

Government Procurement-This person represents the offices that do procurement for local and state governments. They authorize procurement for a wide variety of transportation related items such a traffic signals, signs, bus fleets, and any other ITS components. It is their job to decide which kinds of ITS technologies to buy for the government to install on the roadways.

Federal & State Government Perspective

The Federal & State Government Perspective focuses on the interests of federal, state, and state law enforcement. The government is the largest advocate of nationwide ITS deployment. The primary interests of state and regional governments are very similar: efficient management of roadways and related resources. The three roles in the Government perspective are:

Federal-This person is interested in effective deployment of ITS across the country. They support many different regional efforts to develop and deploy ITS. Limited funds means that they are interested in supporting only the most promising projects.

State-This person represents the interests of the Michigan Department of Transportation (MDOT). Their responsibilities include the maintenance of state roadways and planning efficient use of resources.

Enforcement-This person represents the interests of the state law enforcement. Their interests include surveillance, and fast incident response.

Interest Group Perspective

The Interest Group Perspective represents the ITS-related interests of a wide cross-section of citizens and interest groups. The three roles in the Interest Group perspective are:

Civil Liberties-This person represents a variety of interests that include protecting our civil liberties. ITS promises many benefits such as better access to transportation for all levels of society, but an efficient ITS deployment requires surveillance at many levels. They are concerned about the protection of our civil liberties, such as the right to privacy, and equity issues.

Environment-This person is concerned about how our roadways and vehicles affect the environment through noise and pollution and unsightliness. ITS promises that through reduced congestion and travel times, pollution caused by exhaust fumes will drop. But will more efficient roadways ultimately lead to even more vehicles on the road than now, thus negating any possible benefits?

Transportation Disadvantaged-This person represents the poor, aged, youths (under 16), and disabled population who are dependent on public transit and para-transit for their transportation needs. They need to be able to shop, visit friends, make doctor appointments, get to their jobs, and otherwise do all the things that other people do as well. They require convenient, efficient, affordable, and safe public transportation that can meet any special needs they may have (for example, wheelchair accessible) and allow them to contribute to society as well.

Local Government Perspective

The Local Government Perspective addresses concerns of the regional, county, and local governments of Southeast Michigan. Roadways are becoming increasingly congested, yet available land resources

decrease. Additional roadways are not the solution. They need new methods for the efficient management of state roadways. The three roles in the Local Government perspective are:

Regional-This person's responsibilities include the maintenance of regional roadways and regional police and fire departments. They are interested in safe roadways and quick emergency response. They face the problem of coordinating local counties' effort to deploy ITS.This person represents the interests of the region of Southeast Michigan.

County-This person represents the interests of the counties of Southeast Michigan. These counties include a large, heavily urbanized area surrounded by rapidly expanding suburban communities. Their interests also include the maintenance of county roadways and county police and fire departments. They are interested in safe roadways and quick emergency response. They need new ways of dealing with increased congestion and road maintenance.

Local-This person represents the interests of local city governments in Southeast Michigan. They are interested in maintenance of city roadways and regional police and fire departments. They are interested in safe roadways and quick emergency response. They also have an urban population that relies on public transit for their transportation needs.

Researchers Perspective

The Researchers Perspective represents those bodies that perform research. They address issues that are of concern to those groups that are contracted to do ITS and related research. Their interests are in funding current and future research into potentially viable areas. The success of current research can affect funding for future research. The three roles in the Researchers perspective are:

Aerospace Industry-This person represents the interests of Aerospace industry. They are interested in developing research that will prove to be commercially viable and result in advancement and profit for the company.

Consultant-This person represents the interests of private consulting firms. They are interested in selling their skills and expertise to other parties, predominantly other industries and government. The private consulting firms also carry out a great deal of evaluation research with ITS.

Universities-This person represents the interests of public and private universities as well as national research laboratories. An important aspect to doing research is acquiring enough funding to support the research, thus they are interested in research areas that are important to the government and/or private funding sources.

Telecommunications/Electronics perspective group.

The Telecommunications/Electronics perspective represents those companies that can supply much of the physical and information infrastructure necessary for a successful ITS deployment. The three roles in the Telecommunications/Electronics perspective are:

Auto Supplier-This person represents the interests of the auto suppliers. Auto makers buy a large number of components for their vehicles from you. They are the companies which will be producing the in-vehicle units (IVU) for ITS. They are only interested in producing IVUs if there is a demand for them. This means that auto makers must want to put IVUs in their vehicles, and that the appropriate physical and/or information infrastructure must exist for the IVUs to be useful.

Communication Service Provider-This person represents the interests of the cellular communications companies. They have the resources to collect and disseminate information. ITS promises to offer a whole new market for your services.

Information Service Provider-This person has the resources and ability to collect and manage data. Their interests include collecting ITS data, organizing it in a useful manner, and selling it to interested parties. Or, alternately, being granted contracts to collect and manage ITS data for interested parties. These parties include the government and private sector corporations.

Appendix E: Description of Suggested Benefits from ITS Deployment

Transportation Operations

Increased System Throughput-ITS has the potential to effectively increase the capacity of the transportation system by increasing the number of travelers that can use the system at any given time without adding new roadways.

Reduced Duration & Variance of Travel Time-By providing travelers with traffic information, including diversion opportunities, ITS can reduce the average amount of time spent traveling as well as the unexpected variation in travel time.

Integration of Transportation Modes-By enhancing the accessibility, reliability, and safety of all modes of transportation, as well as enhancing modal information, ITS can integrate the modes to create a seamless transportation network.

Community Welfare

Healthier Environment-ITS may promote a cleaner environment by reducing overall emission of certain harmful pollutants.

More Efficient & Sustainable Use of Current & New Resources-ITS can lead to efficient use of resources by promoting wise community planning, and by promoting measures to increase transportation system capacity without building new roadways.

Personal Welfare

Enhanced Safety-ITS offers the potential to enhance traveler safety by decreasing the likelihood that a traveler will be involved in an accident, as well as improving emergency vehicle response to accidents that do occur.

Enhanced Security-ITS can enhance traveler security through safeguards against the incidence of crime, and, therefore, produce safer public and private travel situations.

Reduced Traveler Stress-ITS is capable of reducing travelers' general stress level by providing them with alternative routes during periods of non-recurrent congestion, giving them information about unfamiliar areas, reducing their uncertainty about public transit schedules, and so on.

Mobility

Improved Public Transit-ITS may increase the convenience and predictability of public transportation by making schedule and fare information more accessible and improving schedule adherence.

Broadened Travel Opportunities-ITS holds the potential to benefit travelers by increasing awareness of and accessibility to trip-end opportunities.

Greater Traveler Independence-ITS enhances traveler independence by increasing the ease and value of private travel.

Economic Strength

Increased Productivity-ITS can lead to productivity increases by making travel more efficient for individuals driving private or commercial vehicles. Efficiency gains come through increased predictability of travel time and reduced overall travel time.

Enhanced Industry Competitiveness-ITS offers the potential to improve the competitiveness of industry by improving commercial trucking and shipping operations. Improvements that might be expected include more reliable delivery times, better materials tracking, streamlined administrative processing, and more efficient scheduling of maintenance.

New Industries and Jobs-The deployment of ITS may serve as a catalyst to new industries and related employment opportunities.

Increased Tourism-ITS can lead to increased tourism by enhancing the desirability of surface transportation through increased availability of travel information and better accessibility to desired destinations.

ITS Growth

Greater Awareness of ITS-Early ITS deployments will increase the "ITS awareness" of both individual travelers and business and government concerns thereby enhancing the potential of acceptance of further ITS deployments.

Existence of an ITS Infrastructure to Facilitate Product Development-Deployment of an "ITS infrastructure" would provide a platform enabling further development of a variety of ITS products.

Expanded Knowledge Base-Research, development, deployment, and evaluation in support of ITS can enhance the existing base of theoretical and applied knowledge.

Regulation & Commerce

More Efficient & Equitable Fee Collection-ITS can contribute to more efficient collection of transportation fees (such as automated toll collection), as well as more equitable fee collection (such as variable toll rates based on level of congestion).

More Efficient & Fair Regulation and Enforcement-ITS can enable better observation of and action pertaining to vehicle regulations, traffic ordinances, and commerce laws.

Facilitated Movement of Interjurisdictional Goods-ITS can improve commercial vehicle administrative processes, thus creating transparent state and national boundaries, and so facilitate the interjurisdictional movement of commercial goods.

Appendix F: Description of ITS Services Included in the Game and Seminar

The ATMS/ATIS and CVO services used in the ITS Deployment Exercise were divided into four categories: public, public/private, private, and public/fleet.

Public

Pre-Trip Traveler Information-This service provides information to travelers at their home, office, or public place.The information is intended to enable travelers to make mode choice, departure time, and route choice decisions that better suit their needs. “Yellow Pages” information is also provided.

En-Route Driver Information-This service provides information to travelers while in their vehicles. The information is intended to enable travelers to make route choice decisions that better suit their needs. “Yellow Pages” information is also provided.

Coordinated & Adaptive Signal Control-This service improves the efficiency and effectiveness of traffic signals by moderating the timing of a number of related signals in response to existing traffic conditions.

Public/Private

Mayday-This vehicle-based service automatically transmits vehicle location and a request for assistance to emergency services personnel upon occurrence of an incident. A vehicle occupant can also actively request assistance.

In-Vehicle Signing/Real-Time Hazard Warning-This service provides an in-vehicle display of directional and regulatory signed that are posted along the roadway. Real-time warning of road hazards, such as ice, fog, incidents, etc., is also supported.

Private

Pre-Trip Traveler Information-This service provides information to travelers at their home, office, or public place. The information is intended to enable travelers to make mode choice, departure time, and route choice decisions that better suit their needs. “Yellow Pages” information is also provided.

En-Route Driver Information-This service provides information to travelers while in their vehicles. The information is intended to enable travelers to make route choice decisions that better suit their needs. “Yellow Pages” information is also provided.

Route Guidance & Navigation-This service provides instructions to travelers on how to efficiently reach their destinations.

Public/Fleet

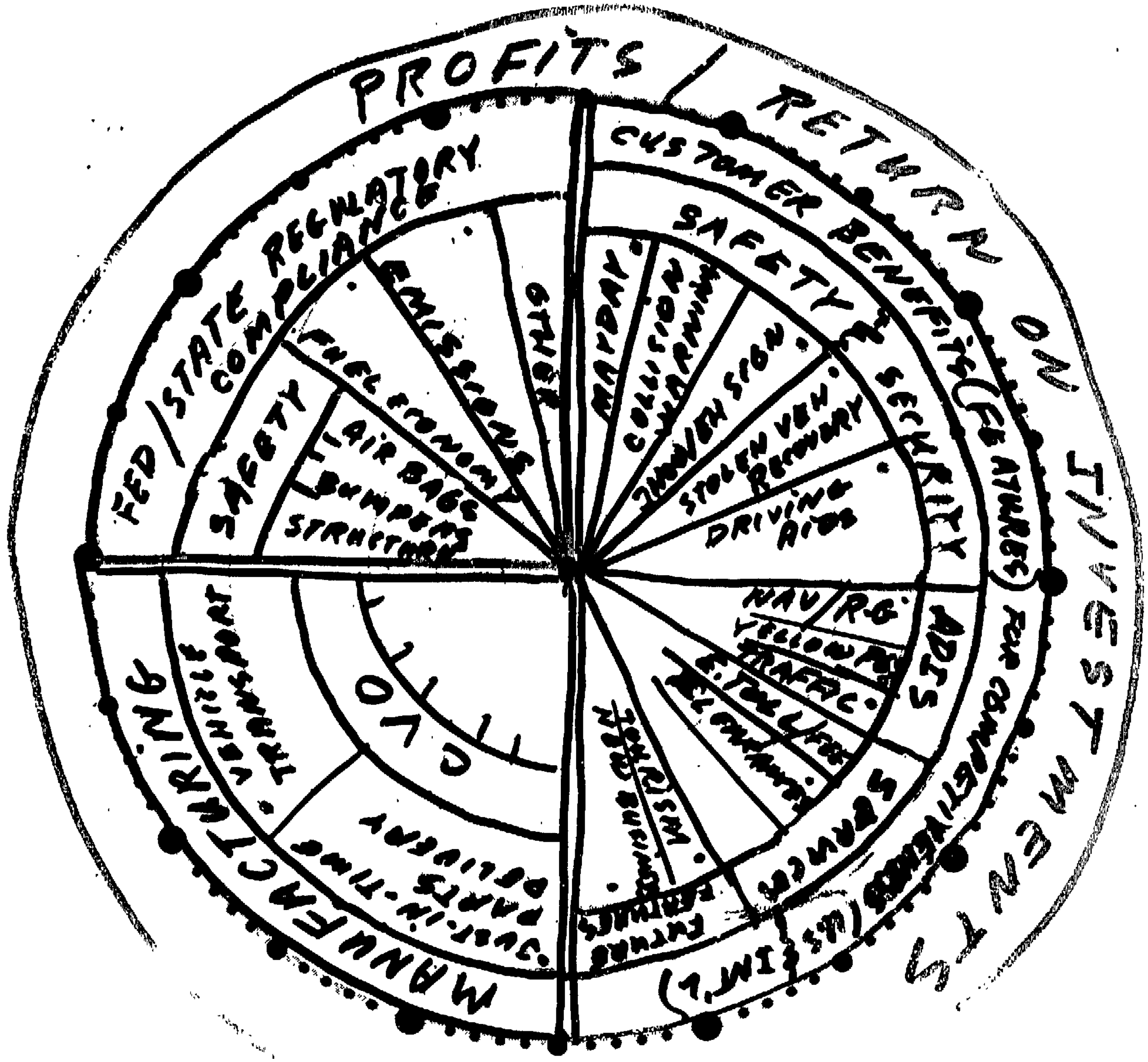
Emergency Services Management-This service efficiently tasks available emergency services resources and directs them to incidents, reducing response time.

Paratransit Operations Management-This service automates many operations and management functions of publicly operated paratransit systems, leading to better service to the customer.

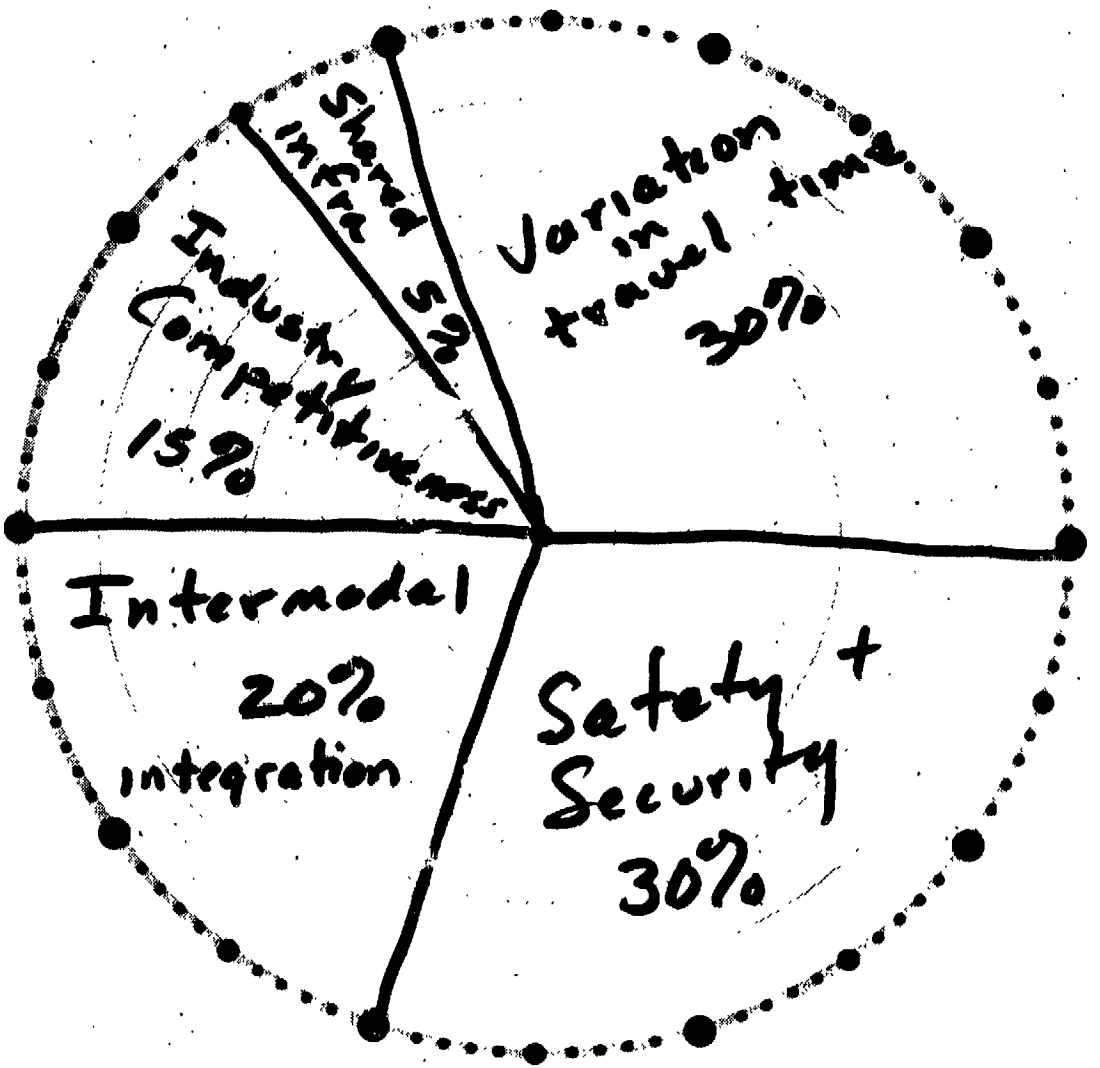
Commercial Vehicle Electronic Clearance- This service facilitates domestic and international border clearance of commercial vehicles, minimizing both the number of stops and the amount of paperwork.

Appendix G: Perspective Group Benefit “Pie-Charts”

Automotive

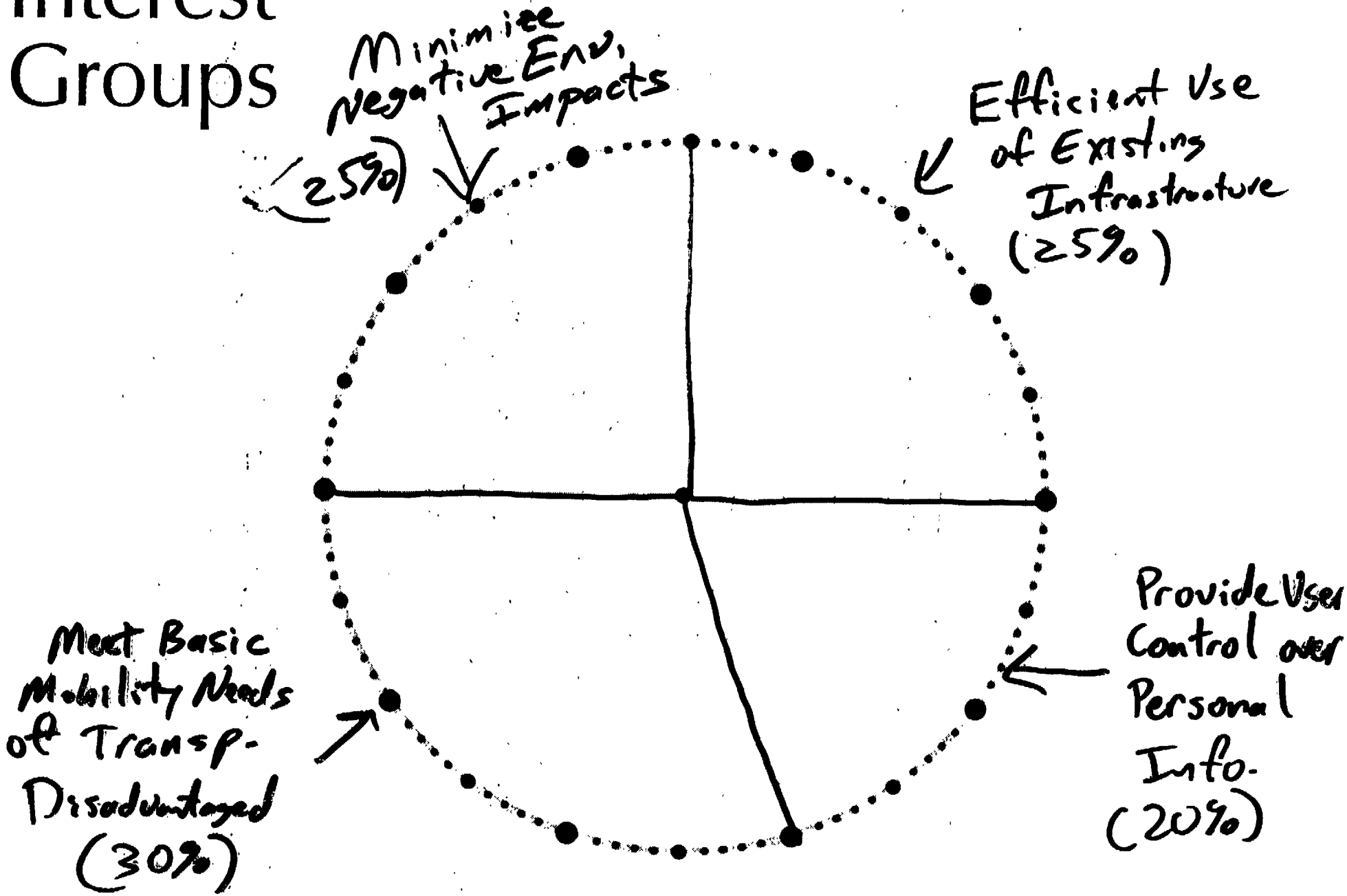

PROFITS / RETURN ON INVESTMENTS
CUSTOMER BENEFITS (FEATURES)
FOR COMPETITIVENESS
SAFETY
MAYDAY
COLLISION WARNING
STOLEN VEH. RECOVERY
DRIVING AIDS
SECURITY
NAV
R.G.
TRAFFIC
ADIS
SERVICES
FED/STATE REGULATORY COMPLIANCE
EMISSIONS
OTHER
FUEL ECONOMY
SAFETY
AIR BAGS
BUMPERS
STRUCTURE
CVO
MANUFACTURING
VEHICLE TRANSPORT
JUST-IN-TIME PARTS DELIVERY
FUTURE FEATURES

Consumers


Shared infra 5%
Variation in travel time 30%
Industry Competitiveness 15%
Intermodal 20% integration
Safety + Security 30%

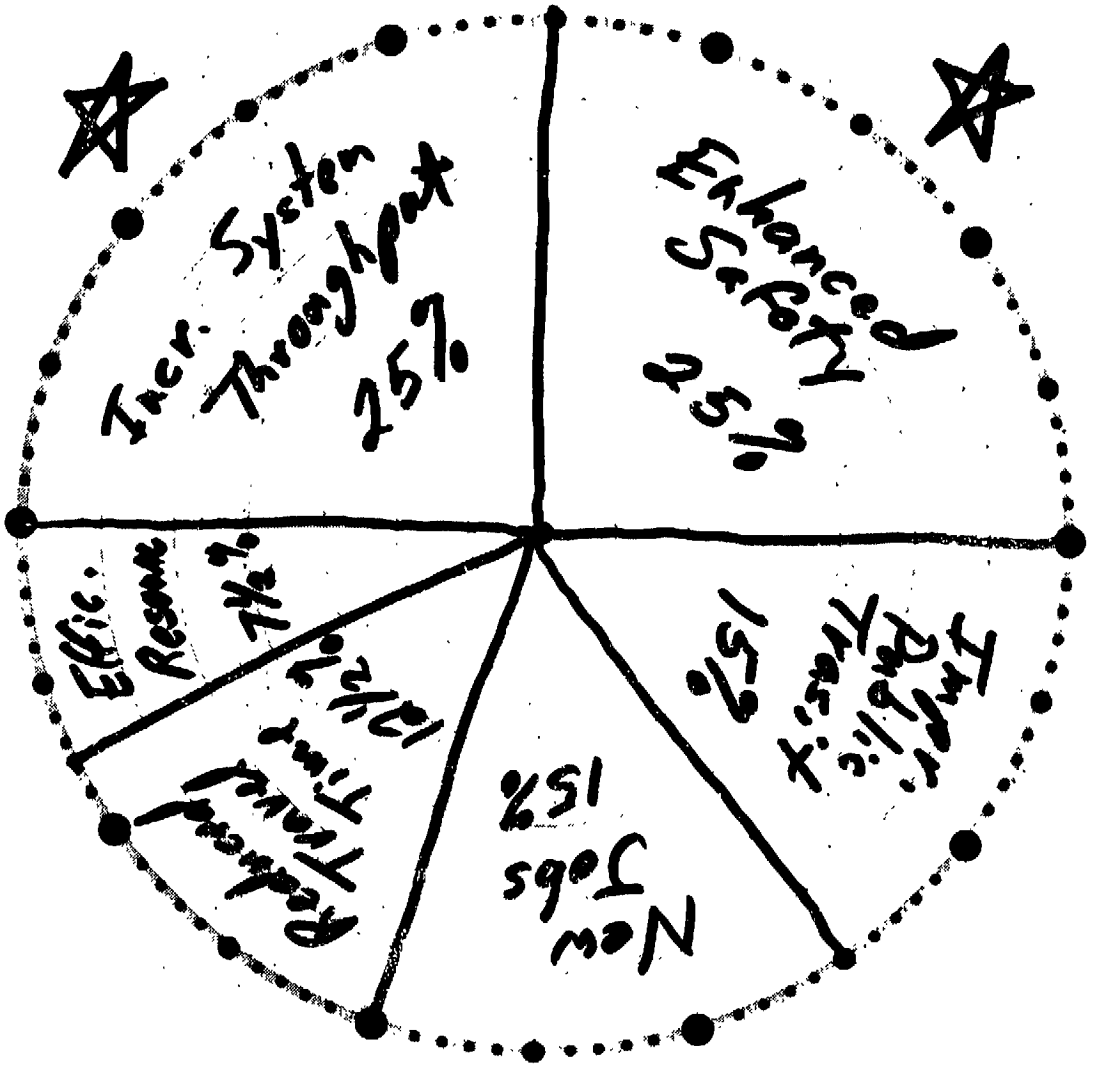
The benefit “pie chart” for the Federal & State Perspective is not available.

Interest Groups

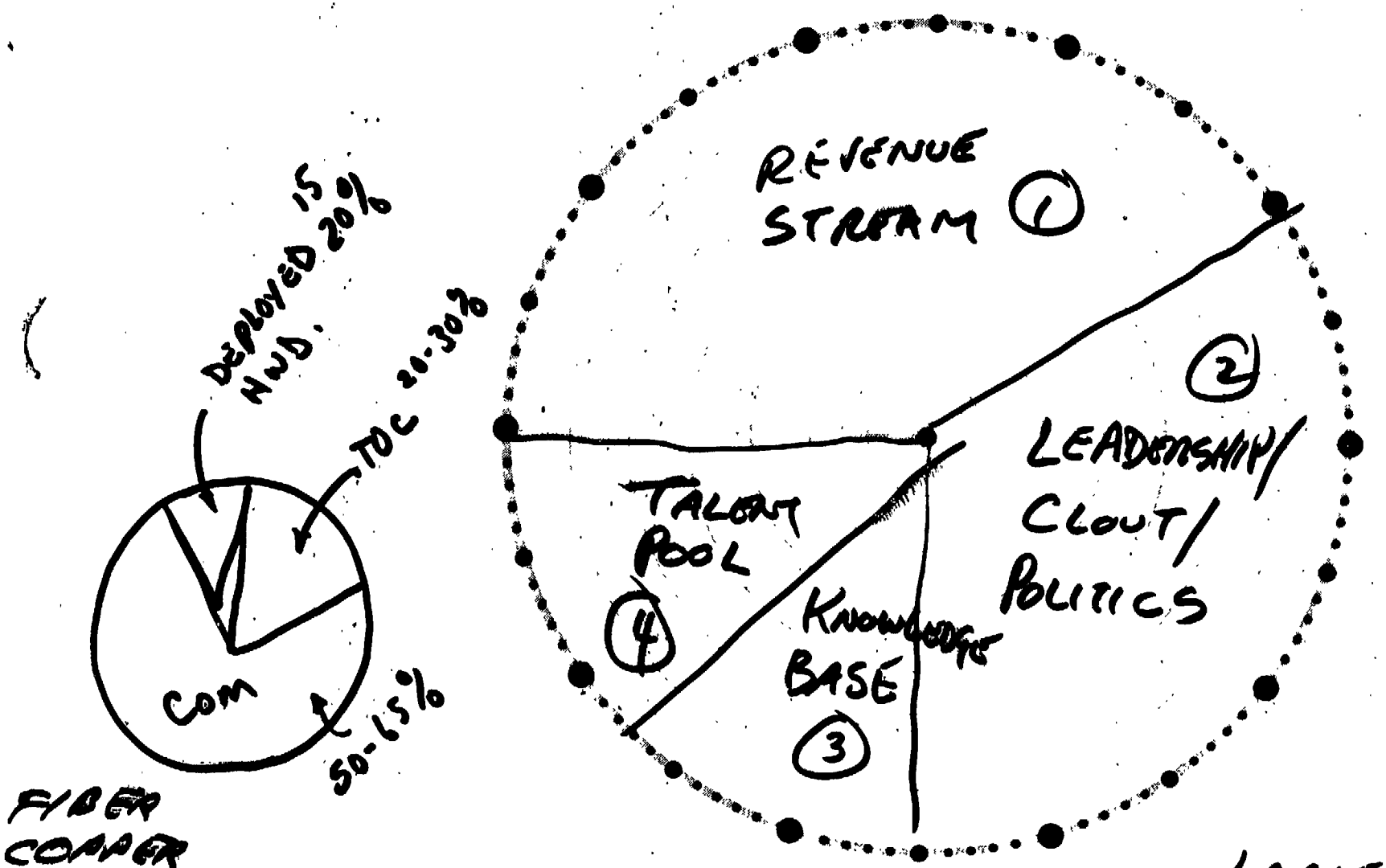


Local Government

Operational Efficiency?

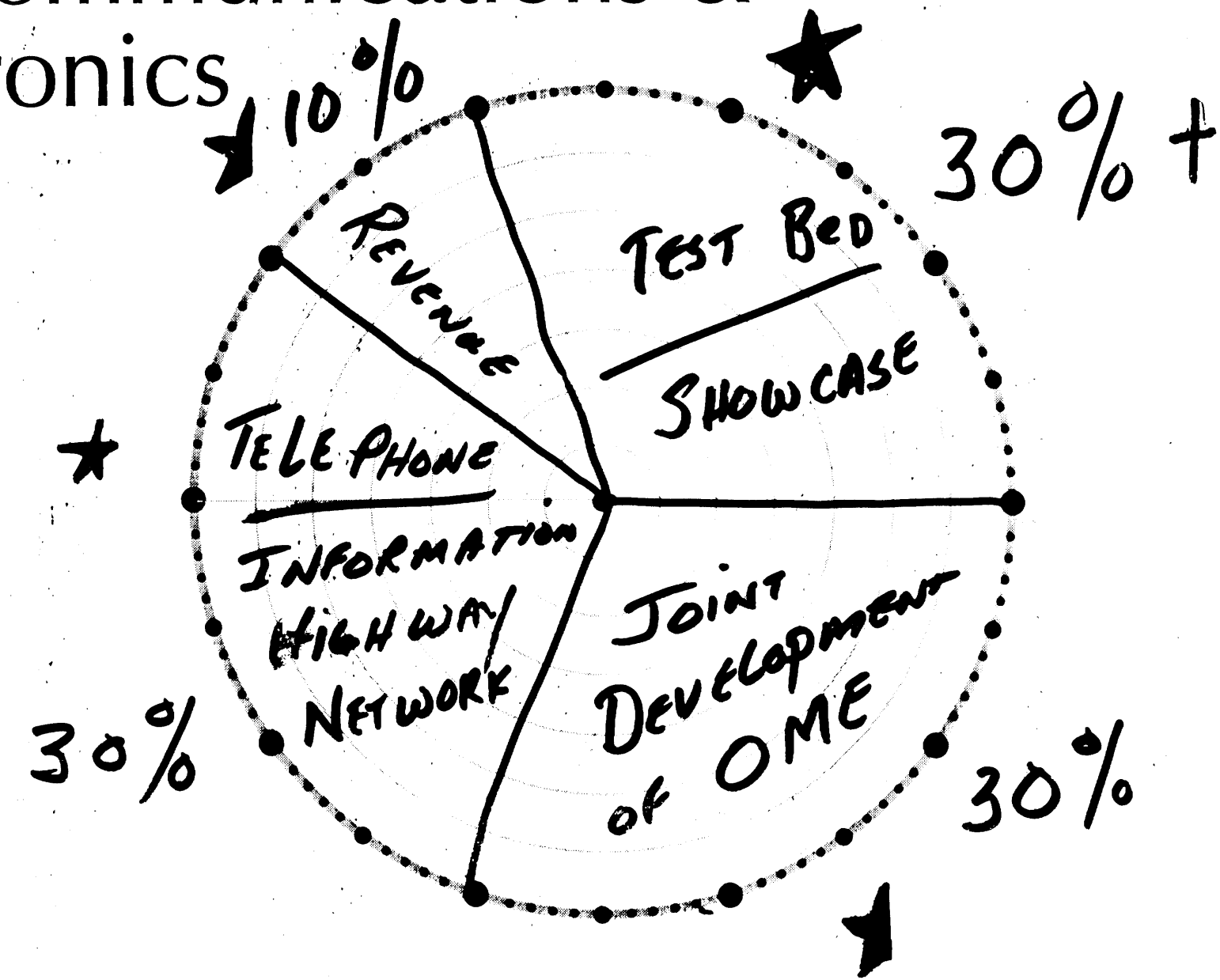


Research



ENHANCE THE DEVELOPMENT OF A VIABLE/ SUSTAINABLE ITS INDUSTRY (PUBLIC &

Telecommunications & Electronics



Appendix H: Description of ITS Subsystems Included in the Seminar

The perspectives chose what "subsystems" they would use to implement each of their chosen services. The perspectives also chose how they would implement each subsystem, i.e., through use of what technologies. Most services did not require implementation of all subsystems. The subsystems, and the technologies available for implementation, are:

Surveillance-This sub-system is used to monitor traffic and roadways, and may include the following technologies: loops, video monitors, video detection, probes, aerial, cellular call-in, ice detection, and weather sensors.

Traffic Control-This subsystem may include the following technologies: CMS, adaptive controllers, kiosks, and tags.

Vehicles-This sub-system is used to provide information to vehicles and may include the following technologies: tags, GPS, compasses, radios, two-way radios, RBDS radios, cellular phones, CD maps, receivers, dash displays, and transmitters.

Payment-This sub-system refers to all methods of payment for ITS services and may include the following technologies: smart cards, subscriptions, commercials, purchase of data (e.g. compact disks with navigation data), 900 numbers, and user fees.

Traveler-This sub-system is used to provide information to the traveler on the go, at home, or at work. It may include the following technologies: radios, phones, PDAs, Internet, cable TV, and kiosks.

Institutions-This sub-system refers to all policies and institutional systems that are required for the efficient operation of an ITS service and may include interjurisdictional cooperation and public/private cooperation.

Centers-This sub-system may include the following technologies: message composition, map and route updates, coordinate signals, forward credentials, phone, scheduling, dispatch, radio, and receivers.

Roadside Communications-This sub-system may include the following technologies: HAR antennae, microwave transceivers, beacons, and beacon correction.

Appendix K: Unit-Cost Estimates For Deployment

Unit Costs

Area Cost = 10 × Link Cost

Center

Coord. Signals - $.5M/Area
Guidance UpDte - $1M/Area
Mess. Comp. - .2M/Area

Communications

HAR - $1M/Link, $10M/Area
μwave & Beacon - $1M/Link, $10M/Area

Surveillance

Probe Vehicle - $5M/Area
Loops - $3M/Link, $30M/Area
Aerial - $.2M/Area
Video - $2M/Link, $20M/Area

Traffic Cont

Signal Preempt - $1M/Area
WIM - $.5M/Link
CMS - $1M/Link
Adapt. Contr - $4M/Area

Model Deployment
$20M

Community-Wide, Full-Up Infrastructure

Center Costs $24M

Roadside Comm. 36M Freeways
[280M Areas?]

Surveillance 54M Freeways [70M w/Probe]
350M Areas

Traffic Control

90M Areas
20M Freeways

574M Total

Appendix L: Participant-Suggested Revised Strawman Plans

LOCAL

Communication

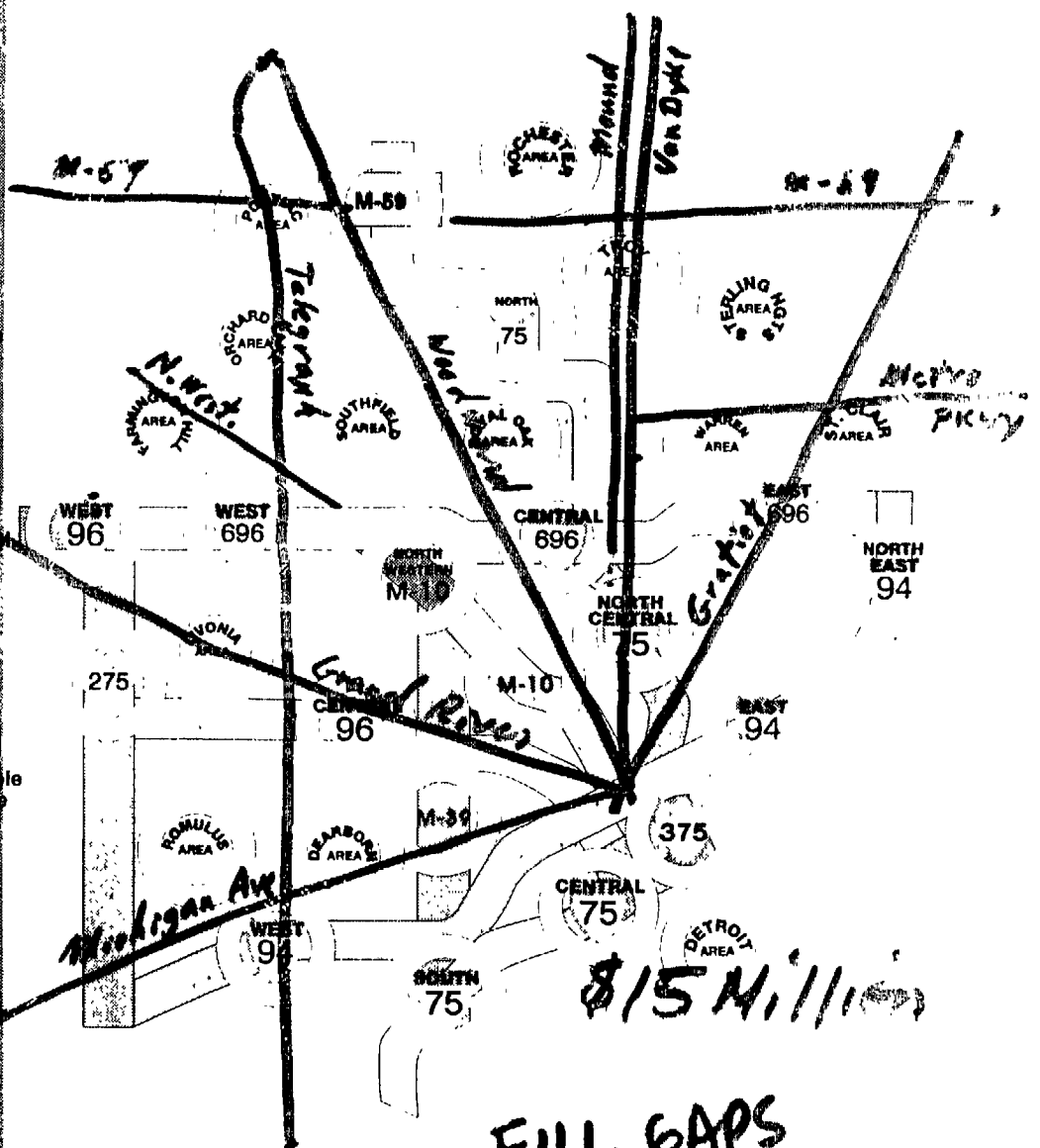
Traveler Institutions Surveillance

GPS
Map DB
Compass
Transmitter
Transceiver
Receiver
Tags
Guidance Display
PDA
Display
RBDS
Radio
2-Way Radio
Cell Phone
Sponsor-ship
IRS Taxes
Equipment Purchase
SMART Card
Sub-scription
1-900
User Fee
Cable TV
Internet
PDA
Kiosks
Coordinate Signals
Guidance Updates
Radio
Message Composition
Dispatch
Public/ Private
Signal Pre-emption
Weigh in Motion
Changeable Message Signs
Adaptive Controller

420 MILLION

~~COMM BACKBONE~~

SENSORS + SIGNAL CONTROL = INFO

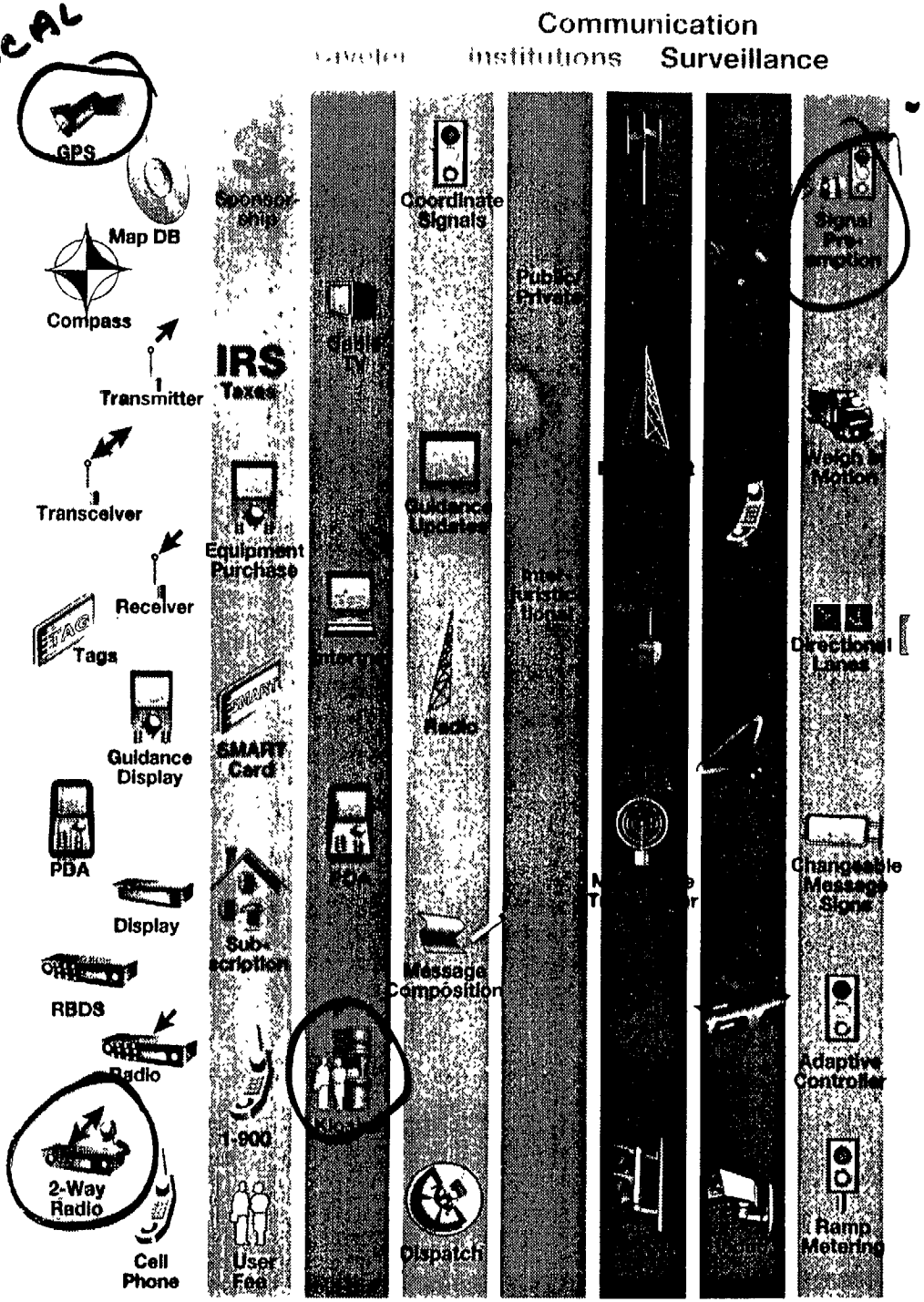


FILL GAPS - MAJOR ARTERIALS

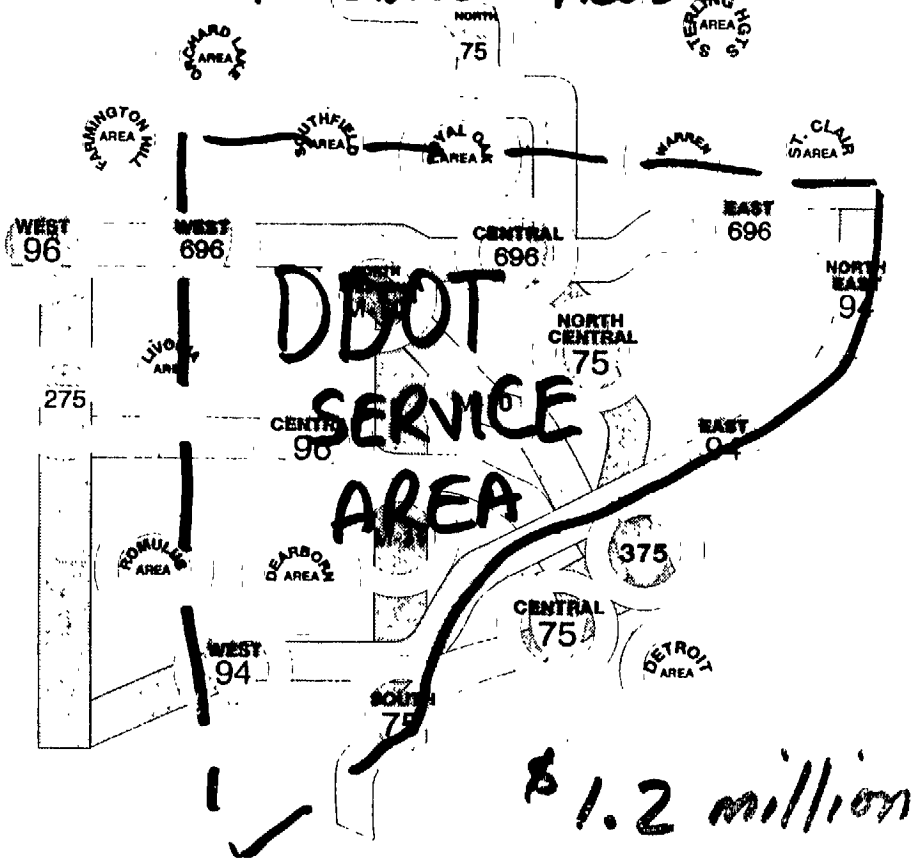
LOCAL CONT

$ 2 C MILLION

LOCAL



- TRANSIT COORDINATION
  - DDOT AVL
  - HOOKS TO SMART DISPATCH FOR SERVICE CONNECTIVITY AT SERVICE AREA BOUNDARY
- TRANSIT VEHICLE PROBES



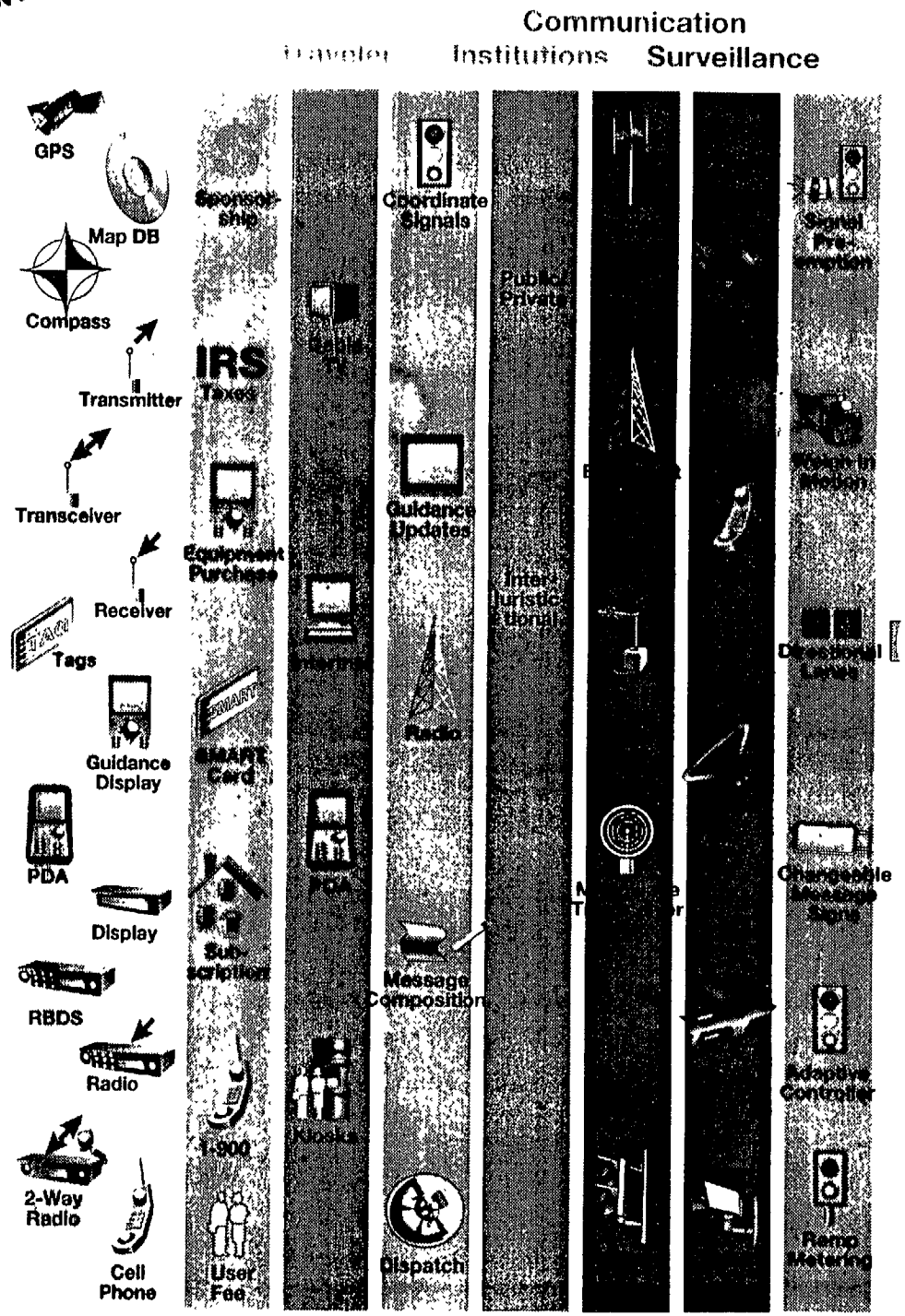
$ 1.2 million

Deployment Area

LOCAL GOV'T

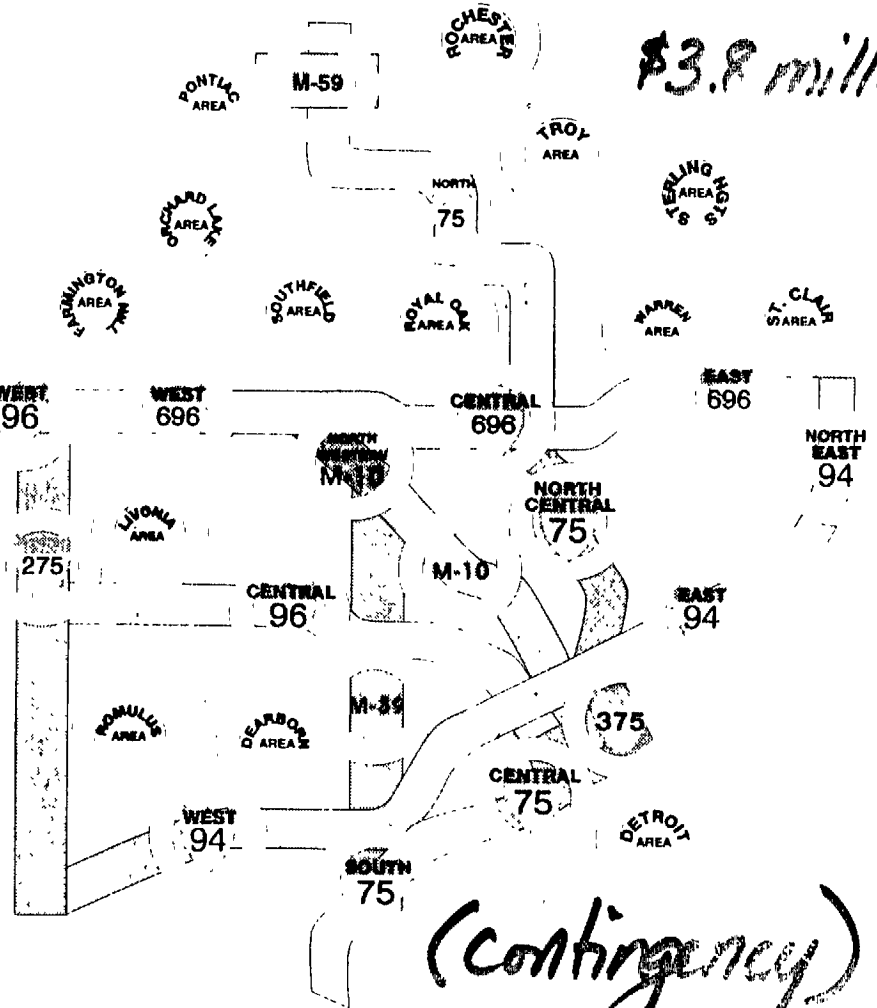
LOCAL

$20 million



SYSTEMS INTEGRATION AND INFO DISSEMINATION

$3.8 million



(contingency)

Deployment Area

LOCAL GOVT

Final Recommendation — Full Deployment — Telecom

Mayday

[A DEVICE FROM A MAJOR MANUFACTURER] $500

use

sell unit to cust for 250 cost $250

GPS, Modem, Hdwre

[A SYSTEM FROM A MAJOR MANUFACTURER]

use for

Dispatch -

cost 0

equip - 4000 vehs

cost $1,000,000

Driver Information

use Mayday Box for GPS

Add RBDS @ $310 cost share $200 $

equip the 4000 vehicles 1,000,000

Software Develop cost

40,000 50% 200,000

Assume Access to Public FM

cost for Misc Hdwre + Disp

& Message 300,000

$1,500,000

[VENDORS]

Approach gov't

to cost share & increase

# of vehicles

TELECOM

What can we do NOW?
Need to do NOW?
with presently available funds?

Educate -

- put ITS in everyhome
in route info 6-9A 3-7P
on cable

Deploy -

what can we do with the least

Pick the very easiest - quickest results

Again to get the public involved

RBDS ~~[redacted]~~ Traffic - anyday

Show + publicize any events

interview people who have used the above

1. Get PVT Industry + Public in planning sessions!

ITS MI is the facilitator or Mechanism

This is a rolling milestone

~~Apollo~~ Apollo 13 -

what can we do with what we have NOW.

NOW.

You can do almost everything with what we have now. Try it out first.

Appendix M: Participant Evaluation of the ITS Deployment Exercise

ITS Deployment Exercise
Evaluation Questionnaire
December 7 & 8 1995

The original objectives of the ITS Deployment Exercise are:

1. Provide a common framework and process for more effective communication about ATIS/ATMS deployment issues;
2. Help participants better understand their own roles, and the potential roles of other organizations, in supporting the deployment of ATIS /ATMS;
3. Foster team-building and public sector-private sector dialogue;
4. Develop a preliminary deployment plan for Southeast Michigan.

How well did the game contribute to our objectives?

	Strongly Disagree		Neutral		Strongly Agree
Provide a framework:	1	2	3	4	5
Understand roles:	1	2	3	4	5
Foster team-building:	1	2	3	4	5
Integration of perspectives:	1	2	3	4	5
Develop preliminary deployment plan:	1	2	3	4	5

How well did the seminar contribute to our objectives?

	Strongly Disagree		Neutral		Strongly Agree
Provide a framework:	1	2	3	4	5
Understand roles:	1	2	3	4	5
Foster team-building:	1	2	3	4	5
Integration of perspectives:	1	2	3	4	5
Develop preliminary deployment plan:	1	2	3	4	5

Please rate the following components of the ITS Deployment Exercise:

	Poor	Fair	Average	Good	Excellent
Deployment Game:	1	2	3	4	5
Deployment Seminar:	1	2	3	4	5
Meals & coffee breaks:	1	2	3	4	5

Did you enjoy the game? Seminar? The entire exercise?

What aspects of the ITS Deployment Exercise did you like? dislike?

Do you think this is a useful process for developing a proto-type strategic deployment plan?

How would you improve the Deployment Game? the Deployment Seminar?

Was the exercise a good use of your time?

Additional comments?

ITS Deployment Exercise Evaluation Summary

	Game: provide a framework	Game: understand roles	Game: foster team-building	Game: integration of perspectives	Game: develop preliminary deployment plan	Seminar: provide a framework	Seminar: understand roles	Seminar: foster team-building	Seminar: Integration of perspectives	Seminar: develop preliminary deployment plan	How would you rate the Game overall?	How would you rate the Seminar overall?	Was the Workshop a good use of your time?	Was this a useful process?
	4	3	4	4	2	4	4	4	4	4	4	4	yes	yes
	4	4	4	3	4	5	4	4	4	3	4	4	yes	yes
	4	4	4	4	3	4	5	4	0	4	4	5	yes	yes
	4	4	5	0	3	4	4	5	2	1	4	4	yes	yes
	5	4	4	4	5	0	0	0	0	0	4	5	0	0
	5	4	4	4	4	5	4	3	5	4	5	5	yes	yes
	4	4	5	3	4	4	4	4	3	4	4	3	yes	0
	4	3	4	4	4	4	4	4	4	4	4	4	yes	yes
	1	1	1	1	1	1	1	1	1	1	5	5	yes	yes
	5	5	4	4	4	5	5	4	4	4	5	4	yes	yes
	0	0	0	0	4	0	0	0	0	4	4	4	yes	yes
	4	4	5	5	4	4	4	5	5	5	5	4	yes	yes
	4	4	5	4	3	4	4	4	4	4	5	4	0	yes
	3	4	3	4	3	4	3	3	4	3	3	4	0	0
averages	3.923	3.692	4	3.667	3.429	4	3.833	3.75	3.636	3.462	4.286	4.214		

Zero values represent "no response" and were therefore excluded when calculating the averages.

Appendix N: Transcription Of The ITS Deployment Seminar

Designed and Facilitated by the University of Michigan ITS Research Laboratory

Friday, December 8, 1995
Gerald R. Ford Library
Ann Arbor, Michigan

[The following text represents a near-verbatim transcription of the ITS Deployment Seminar. Interpretations and/or modifications made by the University of Michigan team are in "[]". The transcription is divided into seven sections following the agenda *for the Seminar.]*

[1. Facilitator introduces Participants and Presents a Seminar Overview]

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): It is good to see you this morning. You'll notice we have microphones in front of us. We are going to be recording the session for the entire day, and Cathy Seay-Ostrowski will be helping us with the transcripts. As a way to start out, I realized that not everybody knows everyone else here, so to help Cathy do her transcription and to help people get acquainted, what I'd like to do is start going around to people, and have them introduce themselves and identify the organization they are from. I'll start over here with you, Kan.

KAN CHEN, UNIVERSITY OF MICHIGAN (AUTO MAKER-COMPANY A): My name is Kan Chen, from the University of Michigan. I'm the facilitator for table number one for the Auto Industry, and I'm also playing Gerry Conover's role.

ED GREENE, FORD MOTOR COMPANY (AUTO MAKER-COMPANY C): Ed Greene with Ford Motor Company.

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B): Good morning, Ivy Renga, I'm with Chrysler Corporation, and I'm the manager of IVHS programs.

JIM BOLGER, MICHIGAN STATE POLICE (FEDERAL & STATE GOVERNMENT-ENFORCEMENT): Jim Bolger, Michigan State Police.

MARTIN MONAHAN, FEDERAL HIGHWAY ADMINISTRATION (FEDERAL & STATE GOVERNMENT-FEDERAL): I'm Martin Monahan out of Federal Highway Administration, from Region Five, Chicago.

KUNWAR RAJENDRA, MICHIGAN DEPARTMENT OF TRANSPORTATION (FEDERAL & STATE GOVERNMENT-STATE): Kunwar Rajendra, Michigan Department of Transportation.

HARRIET CHEN, KAN CHEN, INC. (FACILITATOR): Harriet Chen of Kan Chen Incorporated, Facilitator.

MAC LISTER, SMART (CONSUMER-PRIVATE TRAVELER): Mac Lister from Smart.

PAUL LESCOE, US ARMY TANK/AUTO COMMAND (CONSUMER-COMMERCIAL VEHICLES): Paul Lescoe of Army's Tank Auto Command.

MORRIE HOEVEL, FEDERAL HIGHWAY ADMINISTRATION, LANSING (CONSUMER-GOVERNMENT PROCUREMENT): Morrie Hoevel from the Federal Highway Administration in Lansing.

ALBERT MARTIN, CITY OF DETROIT DEPARTMENT OF TRANSPORTATION (LOCAL GOVERNMENT-LOCAL): Albert Martin of the City of Detroit Department of Transportation.

BRENT BAIR, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-COUNTY): Brent Bair from the Road **Commission for Oakland County.**

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): Jim Barbaresso from the Road Commission for Oakland County.

ZAKIA SHAIKH, UNIVERSITY OF MICHIGAN (FACILITATOR): Zakia Shaikh, University of Michigan.

MEL RODE, SIEMENS AUTOMOTIVE (TELECOMMUNICATIONS/ELECTRONICS-SERVICE SUPPLIERS): Mel Rode, Siemens Automotive.

TOM WISSING, EATON CORPORATION (TELECOMMUNICATIONS/ELECTRONICS-**AUTO SUPPLIERS):** Tom Wissing, Eaton Corporation.

JAY ASEL, AMERITECH (TELECOMMUNICATIONS/ELECTRONICS-COMMUNICATIONS): Jay Asel, Ameritech.

BOB ERVIN, UNIVERSITY OF MICHIGAN (FACILITATOR): Bob Ervin, University of Michigan.

CHIP WHITE, UNIVERSITY OF MICHIGAN (RESEARCHER-UNIVERSITIES): Chip White, University of Michigan.

DONALD ORNE, P. B. FARRADYNE (RESEARCHER-CONSULTANTS): Don Orne of P. B. Farradyne.

OSCAR VILLALVAZO, JR., ROCKWELL INTERNATIONAL (RESEARCHER-AEROSPACE): Oscar Villalvazo, Jr., Rockwell International.

BECKY RICHESON, UNIVERSITY OF MICHIGAN (FACILITATOR): Becky Richeson, University of Michigan.

RUSS GRONEVELT, WAYNE COUNTY **DEPARTMENT OF PUBLIC SERVICES** (INTEREST GROUPS-ENVIRONMENT): Russ Gronevelt, Wayne County Department of Public Services.

GREG COOK, ANN ARBOR TRANSPORTATION AUTHORITY (INTEREST GROUPS-TRANSPORTATION DISADVANTAGED): Greg Cook, Ann Arbor Transportation Authority.

JOSEPH SAUL, INFORMATION TECHNOLOGY DIVISION, UNIVERSITY OF MICHIGAN (INTEREST GROUPS-CIVIL LIBERTIES): Joe Saul, Information Technology Division, University of Michigan.

RICHARD WALLACE, UNIVERSITY OF MICHIGAN (FACILITATOR): Richard Wallace, ITS Program, University of Michigan.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Thank you. Going around it sounded like a couple of the tables were a little louder than the others. Can you make adjustments (to sound people)? Okay.

[Transparencies used in this introductory session are given in Appendix A of the ITS Deployment Exercise Summary Report.1

I hate to use the same bad joke twice, but I'll put it up there anyway because this is what I want to do to get focused on what the task is for today. The focus is on ATIS and ATMS on the ten-year time horizon. However, toward the end, if time allows, we'd like to take a look at how that ten-year scenario might translate into a two-year scenario. It would help us get an assessment for the model deployment, and where we might stand for that. We'll look at infrastructure, and understand what sort of infrastructure will be employed, and how it might be sustained, who will own, operate, and maintain the infrastructure and equip[ment], how much it will cost, and the benefits. We're going to be throwing some cost figures around this afternoon that are very general. The purpose of working with the cost is to keep the exercise constrained. We're not saying that our figures are completely reliable, but it will help to stay within a budget, and to think of the tradeoffs that we are making moving from one technology and service to another.

We're in Day Two. We're getting a little bit of a late start, and the focus is going to be on a deployment seminar. I'm going to be the chief facilitator, and toward the end, Kan Chen and Tom Reed will summarize the results for the purposes of Strategic Planning. Kunwar, I'd like you to make a few remarks on where we go from here, and where the next moves are with regard to Model Deployment. Yesterday was fun, it was kind of a right brain activity. Today I am going to be asking you to really roll up your sleeves. The task itself is very difficult. That is, to ask you about the technical deployment and systems in Southeastern Michigan. I don't want people to get too caught up in the tasks. I want you to take it serious, but that's not the primary product of today's meeting. The primary product is what you say, and what support you provide for whatever your decisions happen to be. And that's why we're making this effort to do all of this, and to get transcripts of all of this, because we want to understand what your interests are, and how it might be implemented through Deployment in Southeastern Michigan.

We have to understand that a day of looking at maps is not going to define what Deployment ten years from now is actually going to look like. There just isn't enough time. By focusing on the task, we need to address many issues, and by addressing them, these issues should surface and come into the discussion that we are having today. So please keep this orientation in mind, and while I want you to take the tasks seriously, please don't get hung up on it. The other thing is that in order to get you moving on this, each one of the tables has a facilitator. You have your own facilitator, so that if you get stuck on any one of the procedures we are going through, the facilitator is there to help you procedurally, but not content wise. We want to hear about your interests and your ideas regarding deployment, not the facilitators ideas.

So again, the product that we are looking for is an exchange of ideas of deployment in Southeastern Michigan. We want to look at deployment alternatives, the roles of the various organizations, possibilities for coordination and cooperation, and then we are going to be recording this for use in development of a report on this workshop for incorporation into the Michigan Strategic Plan through Kan Chen and Tom Reed. Hopefully this can be a stepping stone for some of the

thinking on Model Deployment. We are not doing this only for Model Deployment, but this could be very useful when thinking about the two-year time horizon within the context of ten.

With regard to logistics. Most of this you should already know. I just want to remind you that we do have telephones out in the corridor, and please try to restrict that to breaks. I want you to use your breaks also to look at the beautiful diagrams that we have of the Southeastern Michigan Deployment. I'm providing a Strawman to get you started on your efforts, and so the Strawman is slowly being placed on the board while we are working on the first couple of steps. So during the first break I would ask you to come up here and take a look at the maps, and what we've done with regard to thinking about Deployment in Southeastern Michigan. And one of your tasks is going to be to modify the Strawman. So we've gotten you going, what we're asking you to do is to make modifications to something we've already given some thought to.

Regarding departures, I'd like you to stay till the very end. And the end is scheduled for 5:00 this afternoon. One of the things I didn't mention yesterday was that a lot of effort went into this, and I'd like to introduce the designers that are with us. I can see that Mark is very busy. Is Richard Duke here? Dick, of course you met him. Mark LeBay is responsible for the posters here not only much of the design, but all of the graphics. And as you can see, he's done a wonderful job. Lisa Leutheuser, you met her last night. She's one of the designers, and Tom Reed, they are all responsible for completing a variety of tasks to make sure that this is gonna come off as planned. And Bob Ervin has been involved in this activity from the start as an advisor.

We've brought ideas to him in successive stages, and he's also helping out getting some of the materials ready. Chip and Kan Chen have also provided valuable input to this, and Cathy [Seay-Ostrowskil and Kathie [Dunk] have made all of the arrangements to make sure everything is running smoothly. So we've had a lot of people involved in this.

At each one of the tables we have facilitators. They've introduced themselves as we went around. Kan Chen for automotive. Harriet Chen at the Consumer table. Bob Ervin for Telecommunications. Tom Reed at the Federal and State Government. Zakia Shaikh at Local Government. Becky Richeson with the Research Group, and Richard Wallace with the Interest Groups. We've gone through each one of the steps and the procedures for setting up the Deployment, and so if you run into any snags, these are the people that can help you out.

Now I'd like to turn our attention to: What do we mean by deployment? I don't expect you to grasp all of this right now. You are going to understand this when you sit down and start working with your maps and your matrices. For now I'm going to give a brief introduction and then I'll go through it again at a later step when you are working on these activities. When you are actually working on it, the facilitator should be helping you.

As a way of introduction, these are the things we are going to be looking at with Deployment, starting out with the roles. Each table represents a certain perspective on the Deployment in Southeastern Michigan. There are real experts and good representatives in each one of these groups portraying these roles. We are asking you not so much to talk as yourself throughout the exercise, but portray this perspective as accurately as you can. For example, with the Federal group,

you may have your own opinions: Kunwar you may have your own opinions about the State, but really try to think about your organization's perspective, and how they would respond. That's what we are asking for. This applies to every one of the tables, so that you are not just representing your own special interest, but rather we want to understand each one of the perspective interests throughout the exercise.

Second, we are focusing on services. That is a very important part of the architecture and understanding of Deployment. We have subsystems that we are going to be looking at, and various pieces of equipment and infrastructure that will provide functionality in those subsystems, and this will be implemented/related geographically. We are going to look at the geographic distribution of the subsystems, costs and benefits, and institutional arrangements. We are not looking at standards because not many exist at this stage. We would if they did exist, and we can talk about that as a institutional issue. Timing, we are assuming a ten-year time horizon, but we'd like to move back to two years, and then we want to be able to pull this all together.

When you lay it out like this you can see how extraordinary the task is. Maybe not everyone sees the tasks of setting up deployment exactly the way I do, but everyone should have a similar list in their mind, and an idea of how they would pretty much attack it. You can start with infrastructure and work your way to who would be involved in infrastructure, or you can start with the geographical distribution, what's already there. You can start with any one of these areas, and work your way into another area. So it's a very complex problem that has many different solution approaches. We are going to take one [approach] today, that's logical, and you may be a little uncomfortable because you have a different idea of how it should be done, but I think that because the emphasis here is on communication, we want everyone to be on the same base throughout this activity. Please go along with me through the procedures, and again realize that it is the discussion we are after rather than the actual steps or the logic of it. Then we'll get a lot out of this.

So let me talk a little bit about the logic of the approach that we are going to take. It's based on a simple matrix of services like information, or route guidance that you'd recognized as services you provide, and how they are provided through the various subsystems, like surveillance, or roadside communication, or traffic control centers, or traveler subsystems. We have services by subsystems, and the question that we'd like to answer is: How is this subsystem being provided in order to yield this service? Is surveillance being provided by a loop, or is it being provided by a video camera? Is it even being provided in order to allow this service to come into effect. And this can then realize itself in two ways. One is at the subsystem level, asking where the infrastructure is deployed. So you go through the surveillance and traffic control center and traffic control column, and essential tally up for each service what needs to be provided and then geographically distribute surveillance and roadside equipment and see where those subsystems are deployed. That is one approach that we take.

Another is going to be at the service level. In order to provide a service, you need some subsystems in place. You need either surveillance, or you need various forms of communication or receivers. In order to provide that, or once you have all of those things, then that

service can be provided to a region as long as you have an infrastructure in place. So what I am representing here is that surveillance is used for both traffic information and route guidance. You have sufficient surveillance in this area. As far as roadside communication, you just had it covered in this area. Public traffic information has more limited deployment than route guidance here. This is the kind of thinking that is going to go into most of our activities today. You'll be able to pick it up a little bit more and see the overall' complexity of it when you sit down with your own sheets and make changes.

Again, the emphasis is on communication and we're just providing the medium to support that communication. And we are going to go through a number of steps and this is what we have in mind. After my introduction, we're moving on to formulation of objectives or [stating] your potential benefits, then we are going to introduce the Strawman deployment, take a break, and then it's up to you to modify the Strawman Deployment we are providing, which includes both the system design and the service coverage plan. During lunch, we are going to take all of your input, and this group of facilitators has a responsibility of synthesizing it all. So something magical is going to happen over the lunch break, and highly intuitive. We're not sure how we are going to do it, actually. We are going to pull it together, and then provide the group with essentially a starting point.

Using inputs from the morning, we are going to describe what we've come up with based on your inputs, and then we'll look at that plan which will be presented on the wall, and we'll just discuss possible modifications to our synthesis. Once we come to a fairly good agreement on that for the ten-year plan, then later on we can work back to some consensus of what we would want to do within two years. We're to do this taking into account cost constraints.

So I've given you a lot of information. Again I don't expect you to be picking up on all of it; much of this is going to be repeated. Are there any general questions I might be able to address at this time.

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B): How much of this we be able to take back home with us, Steve?

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Well, what would you like to take home, because we'd like to be able to facilitate that?

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B): Personally, I guess I find the charts that you've got on the wall here are obviously new to me and I'd like to be able to take those back and when I have some time, take a look at them and see the relationships. You know, think about them a little bit more.

[The "wall charts" referred to are the ITS Services Coverage Map for the Strawman Deployment Plan and the ITS Subsystems Deployment Map for the Strawman Deployment Plan. These maps are given as Figures 5 & 6, respective/y, in the ITS Deployment Exercise Summary Report.]

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Well, we are putting together a report based on these activities. With the wall charts, of course, they are very expensive to produce. We could see what see what we could do about making smaller versions of them--if they are of real value.

BRENT BAIR, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERN-MENT-COUNTY): I agree with ivy. I know you are working on a report. But just having that chart, that chart, and a third one, you know. I'm assuming that when Mark created this, he put it on the computer. If he would just print that out and get us a color copy, you know, I'd be glad to buy one. You don't need to go build a big one. I'd like to walk out of here with at least those three.

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B): Make it an 11 X 17. [LAUGHTER.]

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): I agree.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Well, we do have these for each one of the services. And this will mean a lot more to you after you get through the activity. Although some of this we can use as part of our input to our summary. I haven't really thought about what you could take beyond the report.

CHIP WHITE, UNIVERSITY OF MICHIGAN (RESEARCHER-UNIVERSITIES): If one of the ancillary bi-products of this activity is going to be a proposal, we may want to think a little more carefully about ensuring that whatever we give out doesn't diffuse to potential competitors.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL **GOVERNMENT-REGIONAL):** You mentioned communication as being an important component of this process. Do you mean communication within each group or are we going to have an opportunity to interact with the other groups?

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): It is probably the communication between groups that we're looking at, but we're going through in each step a number of round robins based on consensus that is developed in the group, so following some planning activities in the group, then everyone will want to know what you came up with, so it is up to the represen-tative of your group to make a presentation for the group. Yes, Oscar?

OSCAR VILLALVAZO, JR., ROCKWELL INTERNATIONAL (RESEARCHER-AEROSPACE): I'm already getting a little concerned, just based on the couple of things that you said. The purpose of this workshop is to stimulate our thought process. We've all got an active interest in ITS. One of the concerns that I have is that we'll get so stimu-lated with this Deployment. Kan Chen is not going to finish the study until May or April of next year. But we want to go off and imple-ment. What do we do? Do we just wait? I mean personally, if this thing really does stimulate us the way it is, that when we meet in January when we have our next meeting we ought to continue part of that process. So if that's part of what is gonna happen long term, then we're in good shape, but if it's gonna be stimulate today, and then Kan Chen's gonna go off and you guys are gonna compile something, then there is a lot of time between when you publish this thing and what we can do.

KUNWAR RAJENDRA, MICHIGAN DEPARTMENT OF TRANSPORTATION (FEDERAL & STATE GOVERNMENT-STATE): I think May is the final date--there will be a draft, kind of an interim product soon after this. It will come much sooner than May.

OSCAR VILLALVAZO, JR., ROCKWELL INTERNATIONAL (RESEARCHER-AEROSPACE): From my standpoint, I look at January, February, March. We're off trying to deploy some of this technology, then I think we ought to discuss part of what we learn here in January, and continue part of that process, and find some way for that feedback to keep getting back to you, Steve, so that the study continues to be updated. If this happens, then that's good stuff. Where the concern comes in is if that's not the plan, then we are gonna get pretty frustrated, because we're liable to take this thing and go off in a different direction than what the conclusion comes out to be.

KUNWAR RAJENDRA, MICHIGAN DEPARTMENT OF TRANSPORTATION (FEDERAL & STATE GOVERNMENT-STATE): The time is what we make it to be. If we think it is gonna be more effective for us to do it in January, or February, or something like that, then that's what we've got to do.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): We've talked about this ourselves. And we agree that we'll only be able to get through this at one level today. And that probably we'll need to take it further. And by taking it further, we'll get more out of it.

However, our project is defined in terms of this meeting--and summarizing this meeting. So, some changes would have to be made in support in order to continue the activity.

DONALD ORNE, P. B. FARRADYNE **(RESEARCHER-CONSULTANTS):** I think we're talking about two separate things a little bit. The one is this is a constructed exercise where we are here representing stakeholder groups in order to arrive at some kind of generalized conclusion for action for Deployment in the State of Michigan. The second is that we all represent Stakeholder groups who are in one business who intend to be a part of the Deployment activity. I think for the purposes today, we really have to keep those two ideas separate.

What that means is that the exercise is the exercise, and the continuing professional involvement is the continuing professional involvement. One has a sequence of future steps and the other may not.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Okay. Jim?

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): I think we're all gonna get a feel for some of what the conclusions are. I would hope that we would go back and start implementing immediately toward some of the objectives here. I don't see that this is inconsistent at all.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Certainly this is non-binding. I mean, we are just here to explore, but [if] we will go home with some good ideas that everyone kind of accepts that would be nice.

KUNWAR RAJENDRA, MICHIGAN DEPARTMENT OF TRANSPORTATION (FEDERAL & STATE GOVERNMENT-STATE): You should take this as a compliment. Everyone is starting to get impatient to use the results.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Oh, right. Before we've even started. **[LAUGHTER.]**

KAN CHEN, UNIVERSITY OF MICHIGAN (AUTO MAKER-COMPANY A): I was going to talk about this at the end of the day, but because a number of people here have been interviewed by me, I want to make it clear that the Strategic Plan we are going to develop is for the entire State of Michigan--what we are doing here is focusing on Southeastern Michigan. In the Strategic Plan we talk a lot about AVCS and other services; here it is ATMS and ATIS. I just wanted you to understand that.

KUNWAR RAJENDRA, MICHIGAN DEPARTMENT OF TRANSPORTATION (FEDERAL & STATE GOVERNMENT-STATE): You mean like a subset of the Strategic Plan.

KAN CHEN, UNIVERSITY OF MICHIGAN (AUTO MAKER-COMPANY A): That's correct.

[2. Perspectives Identify Potential Benefits That Might Accrue From ITS Deployment]

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Okay, for each step I've provided a summary, so now that we've gotten through the introductions, I'd like to move on to some work. The first step is easy and straightforward. It is easy compared to some of the other steps. The objective that we want to address is to establish motivating forces for each perspective. Why would you want to be involved in this and what's in it for you. And compare the differences and similarities among the perspectives.

The process that we'll follow is to discuss within the groups your perspective, and identify potential benefits for your organization. And we've provided in your notes a listing of possible ITS benefits. You don't have to stick with that. You might want to work without that list and think about how your group would benefit and what's in stake for you. We want to translate these potential benefits to relative weight. What are our expected benefits? For example, for the Automotive Industry, we've provided these pies. And the task is pretty simple. It is to identify your potential benefits around the pies, make some pie wedges, and attribute certain sizes to the slices that will illustrate the relative importance of that benefit to you. **It** should reflect the consensus of your table, which may be hard or easy, depending on the homogeneity of your table. If there is any disagreement, please let us know what the nature of the disagreement was because, again what we are trying to do is communicate and find out where there is agreement and where there isn't. And then we'd like to have representatives for each group. Pick one person at your table, explain your perspective, your pie charts, in a round-robin discussion. Essentially bring your pies up here after they are all drawn up and essentially say this is the kind of discussion that we had and this is why we are doing it the way we are.

[Description of Suggested Benefits from ITS Deployment given in Appendix D of the ITS

What we are trying to get out of this is a comparison of expected desired benefits perspective. So that's the starting point, and it's very similar to what you did as a first step yesterday. I'll be distributing these pie charts, and this task is to take one-hour including the presentations, so you'll have about 10-15 minutes to come to consensus within your group and then we'll have you go around and make presentations. Any questions? And if not, then we can get started.

BOB ERVIN, UNIVERSITY OF MICHIGAN (FACILITATOR): And so the presentation would say, this is our distribution of the pie and this is why.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Yes.

[DISTRIBUTION OF BENEFITS PIE CHARTS AND GROUP CONSENSUS]

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Okay, does anyone need anymore time. How about the auto makers? About ready to go?

We're start with the local government table. You have about five minutes. And we'll proceed counter-clockwise.

[Benefits pie-charts as filled out by participants are given in Appendix F of the ITS Deployment Exercise Summary Report.]

JIM BARBARESSO, ROAD COMMISSION **FOR OAKLAND COUNTY (LOCAL** GOVERNMENT-REGIONAL): If you can't read upside down, I'll turn it as I speak to it. Local government felt that the two most important goals for them were increased travel throughput and increased travel safety. And just under that, this was a real toss-up, we felt we needed to improve public transportation. In local government, we're very interested in the creation of new jobs. To improve our tax base. Which is about the only way we could afford to do any of the other stuff. So we felt that was a high priority along with reduced travel times. If we were able to do that, we'd accomplish a lot of the other objectives of ITS--through commercial vehicle operations and things like that so, we felt that this was important. Efficient resources and better planning, we felt were necessary to accomplish some of this stuff too. We are looking at a comprehensive strategy that involves planning and better land use along with the additional infrastructure and improvements necessary to improve the transportation network.

Now we got up here a question mark, because one of the things we found was missing, having to do with ITS in general, is that it can improve the operational efficiency of governmental organization. Just to give you some examples: For instance, Police dispatching is an example where the information that could be provided could very definitely improve the dispatch operation. We could get the police to an emergency much more rapidly. Winter snow removal, for instance. Pavement sensors that would allow us to have information about conditions of the road. Not only by helping the traveler in providing them with information, but also providing us with a tool for improving our operation. We find that ITS can do that for local government, but really the exercise here, the architecture, and ITS in general, fails to address that issue to the degree that local government feels it should be addressed. And I think that Mr. Gronevelt would agree with that.

So that concludes our thoughts on this, and what we thought was important and how we allocated or resources. Any questions. Comments? Fantastic.

JAY ASEL, AMERITECH (TELECOMMUNICATIONS/ELECTRONICS-COMMUNICATIONS): Well, I'm representing the Telecommunication Industry. And you are probably going to be shocked that we only have 10% next to revenue but I'll give you our reasons why. First of all, we concentrated on Southeastern Michigan as a test bed. We figured that was a critical point with the Big Three and ITS Michigan trying to set an example with maybe ITS expanding throughout America. That's why we only chose 10%. We figure our revenue is going to come later down the road if we can develop something to sell the product.

30% for Test Bed Showcase. We figured Southeastern Michigan is a very good opportunity for that, to showcase what ITS Michigan could do for other parts of the country, other parts of the state, other parts of the region.

Joint Development of OME is 30%. We wanted to be able to generally develop this product from an industry standpoint. What we tossed around in our little talks was: How can we all benefit from this?The manufacture of equipment. How can the Ameritech network help out. How could other developments like the Eaton Corporation help us out.

CHIP WHITE, UNIVERSITY OF MICHIGAN (RESEARCHER-UNIVERSITIES): What is OME?

JAY ASEL, AMERITECH (TELECOMMUNICATIONS/ELECTRONICS-COMMUNICATIONS): Original Manufacture of Equipment. We also threw 30% on the telephone information super highway network. We thought it would be the most cost effective way to develop the strategy. In other words: What's in place today. An example I used: The cellular networks are still growing, pretty much vastly around all the major highways. Why not throw up a cell antenna for the ITS System? It's already there. We don't need to invest any more major capital to develop any more of that part of the network. We agreed that we each had three different kind of inputs, and we jointly agreed on splitting that up in what I thought was a ten-percent revenue being used. We figured revenue will come later. We figured we'd develop what could sell and we'll get our revenue.

ED GREENE, FORD MOTOR COMPANY (AUTO MAKER-COMPANY C): I think what happened thanks to Bob Ervin and his excellent eloquence, but Bob you said this is the easiest pie chart in the world to fill out. It's maybe 95% revenue and profitability, and the 5% is good corporate citizenship or something of that nature. But it was totally driven by income. What we did was look at this area and concentrate on Southeast Michigan and ITS, and think about what we want as suppliers, and OEM's and the telephone infrastructure, and the rest of it. We felt quite strongly that Southeast Michigan should be a showcase. We all agreed with that; it was all on our top priority list.

OSCAR VILLALVAZO, JR., ROCKWELL INTERNATIONAL (RESEARCHER-AEROSPACE): I need clarification on the last one. It kind of lost me a little bit. Is this supposed to be filled out for what the benefits are--TO US? To Telecommunications? And the last one was what?

JAY ASEL, AMERITECH (TELECOMMUNICATIONS/ELECTRONICS-COMMUNICATIONS): Telephone Information Superhighway, Revenue, Test Bed Showcase, and Joint Development of OEM.

OSCAR VILLALVAZO, JR., ROCKWELL INTERNATIONAL (RESEARCHER-AEROSPACE): The benefits to Eaton Corporation in Southeast Michigan would be a showcase. As well as Siemens and Ameritech. You got me sold on two. Revenue and that one. What is the next one? You got me sold on two of them. How is the other one going to benefit you.

TOM WISSING, EATON CORPORATION (TELECOMMUNICATIONS/ELECTRONICS-AUTO SUPPLIERS): The Development of an OEM.

OSCAR VILLALVAZO, JR., ROCKWELL INTERNATIONAL (RESEARCHER-AEROSPACE): How is that benefit for you.

TOM WISSING, EATON CORPORATION (TELECOMMUNICATIONS/ELECTRONICS-AUTO SUPPLIERS): Siemens and Eaton Corporation, working with Ford, General Motors and Chrysler, working with Ameritech, is like an OEM. And that joint development assists us in marketing our products and developing our products. Implement it and the eventual profits come our way.

JAY ASEL, AMERITECH (TELECOMMUNICATIONS/ELECTRONICS-COMMUNICATIONS): We get endorsement from the Big Three to use, and Eaton Corporation is the way to go.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): I would like to keep the comments to clarification only, until we get all the way through.

ALBERT MARTIN, CITY OF DETROIT DEPARTMENT OF TRANSPORTATION (LOCAL GOVERNMENT-LOCAL): The question that comes to me is that: Would you not need the revenue to do the other of things that you wanted to do?

JAY ASEL, AMERITECH (TELECOMMUNICATIONS/ELECTRONICS-COMMUNICATIONS): No, I think we would be a Stakeholder. We'd have to make an investment up front.

MEL RODE, SIEMENS AUTOMOTIVE (TELECOMMUNICATIONS/ELECTRONICS-SERVICE SUPPLIERS): We would probably have to put a fair amount of our own money in it, and that's the way this thing works anyway. It is a wager 20%, 30%, or 50%, or something like that.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): Local government would like to talk to you later.

ALBERT MARTIN, CITY OF DETROIT DEPARTMENT OF TRANSPORTATION (LOCAL GOVERNMENT-LOCAL): Initially, I can understand that, but then at some point, you'd be expecting more than a 10% return, would you not?

MEL RODE, SIEMENS AUTOMOTIVE (TELECOMMUNICATIONS/ELECTRONICS-SERVICE SUPPLIERS): Well, we wouldn't lose money forever. We'd just expect to have to invest for some years and then get a return later.

TOM WISSING, EATON CORPORATION (TELECOMMUNICATIONS/ELECTRONICS-AUTO SUPPLIERS): Ten percent is not a ten-percent return on investment at all. The ten-percent is, the priority of working together and our interest in partnerships in this area.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Okay we're gonna have to move on to the research group now.

DONALD ORNE, P. B. FARRADYNE (RESEARCHER-CONSULTANTS): We had a cross-cutting type of discussion and we resolved it by-giving our chart a title. And I'm the speaker because only I can read what's on the Chart. The title is Enhance the Development of a Viable Sustainable ITS Industry for both the Public and Private Interests. We represent three different parts of the research world: the academic research, the aerospace research, and the consulting industry research, so we have three decidedly different points of view on what the research community is about. But we felt that to be beneficial to us, we had to have a long-term presence and continuity in order to serve the customers that we'd be serving.

Within that context, then, we felt that we really have to have an identified revenue stream, and you have to have (we weren't sure what you'd call this so we gave it three names) leadership/clout/politics. In order to establish the base to even get started in this quest for long-term sustainability, we had to have an identified flow of money, and you had to have the leadership in order to carry it out.

Given that, what would be produced through this research effort would be a knowledge base, and there are several subsets to that. One of you already identified a test bed. That certainly is one aspect of a knowledge base. Provide the technical capability in some of a cohesive, coordinated way. Finally, to develop, train and utilize an appropriate talent pool.

The University research in essence creates the technical talent pool, and the other two (the aerospace and consulting researchers), [who] would be the users of that talent pool, then would serve the ultimate end-user customer.

RUSS GRONEVELT, WAYNE COUNTY DEPARTMENT OF PUBLIC SERVICES (INTEREST GROUPS-ENVIRONMENT): Contrary to most of you, I think our committee finds themselves still in a role-playing mold. I filed a protest with Steve. It is real hard for us to do that, particularly with special interest groups.

We've designated the Special Interest concerns as we were assigned in the three categories. With Environmental taking about 50% of the special interests that might be paying attention by virtue of a population and what support they might get out of the population to assess. Let's say interest groups would more than likely assess **ITS** in terms of negative aspects. So from an environmental standpoint, certainly, you'd want to make sure that whatever is being proposed, with the clout that special interests might have, would minimize the impacts on the environment, and certainly efficiently use the existing infrastructure.

I think that is one of the advantages of ITS. Certainly, it is a lower-cost alternative of utilizing existing infrastructure, rather than having to rebuild it with much more expensive and hard-to-find dollars.

Third, and certainly a group that is not going to go away is the disabled. And to meet the basic mobility needs of transportation of the physically disadvantaged, disabled, we're talking about those that have no other option other than public transit possibly to benefit from ITS improvements. And then within our group, we have personal and civil liberties

concerns, and that particular individual lobbied very strongly for a 20% benefit to provide protection of our personal interests. I'm sure as a continuation of last night. Any questions?

OSCAR VILLALVAZO, JR., ROCKWELL INTERNATIONAL (RESEARCHER-AEROSPACE): This is not so much a question, but rather an observation. I don't know how it will fit. On the charts they just put up, one of them was to make better utilization of existing resources, which kind of echoes what Jim said: Hey I've got this spot here called operational efficiency, but I don't have a fit. When he put that chart up, and I remembered Jim's comment, it kind of reminded me of a combination lock, that you've got one layer going this way, and another layer going that way, and as part of the deployment we are trying to find what the combination lock looks like. That's just an observation of what I'm seeing right now. We'll see how the rest is shown.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): So, you see a match in the economic efficiency?

OSCAR VI LLALVAZO, JR., ROCKWELL INTERNATIONAL (RESEARCHER-AEROSPACE): Yes, it matched right to point that Jim made. The funny part about it was that the point he made was not even in the pie chart.

GREG COOK, ANN ARBOR TRANSPORTATION AUTHORITY (INTEREST GROUPS-TRANSPORTATION DISADVANTAGED): But look at the comparison. Local government pays attention to Special Interest Groups. So there's your match when they start talking because they think in that way. They look to appeal to the Special Interest Groups.

BRENT BAIR, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-COUNTY): I'd like to make a distinction. If you look at the write-up under "more efficient", you see the term "promoting wise community planning . . . ". This is a more long-range thing that we have to undertake for the future. Now an Interest Group will look at that and say that's land-use planning, that's anti-urban sprawl, and by-golly we don't want our hinterlands developing anymore like its been. We want to get some controls in there. That's the interest group perspective. From our perspective, we are looking at locating industries and populations a little more efficiently, planning for transportation improvements, longer-range stuff. So our perspective is a little bit different than that one.

STEVE UNDERWOOD, UNIVERSITY OF **MICHIGAN** (PROJECT DIRECTOR): Let's move along with the auto makers.

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B): Well, Steve, we took into consideration the example you set with your charts on the wall, and we wanted to make sure that we at least matched the quality, so the auto makers created a chart that embodies the kind of example that you've set.

No, it's actually for clarity. First of all, what people seem to forget is that one of the reasons that the auto makers are in business, is to provide return on investment to its stockholders. So we decided that we would draw a bigger pie around the ITS pie, to use the main focus of being in business. Then we went ahead and broke the ITS pie into major areas of perceived benefits. The larger half a pie was perceived to be customer benefits. And then competitive aspects, be it local or

international, **US,** or international. The next quarter we felt was manufacturing. Either in how ITS can aid in the delivery of goods to facilities, or the movement of finished products.

That in general can be benefited by the AVC-type activities. Pre-clearance, etc. We felt the benefits that ITS could bring were Federal and State regulatory compliance, areas of safety, fuel economy, emissions (which may be translated to environment by public groups), and then we left a small slice for other things yet to come, if you will.

But certainly the greater benefits were seen to be the customer or competitive benefits, and that's broken down into safety and security and information, services, and future features. To name a few: Safety and security are things like Mayday, Collision Avoidance, In-Vehicle Signing, Stolen Vehicle Recovery, Driving Aids.

In the feature quarter of the Customer Competitive Issues area we have Navigation, Route Guidance, Traffic Information, and the ATIS part, Toll and Fee collection. In future feature areas we looked at tourism, creating new business as a result of ITS technology applications we're not even sure of today, but will be real in the next five or ten years. The cost will have to be competitive, or else we won't sell the car. Customers, local and in the U.S., are going to have to appreciate the value, or again, we won't be able to sell the car.

JIM BOLGER, MICHIGAN STATE POLICE (FEDERAL & STATE GOVERNMENT-ENFORCEMENT): We didn't get to start until late, and we had only two colors to use, so that's what we have. In government, of the 21 benefits listed in our book, we didn't look at all 21 and try to divide those up. We looked, instead, at our customers, as who we serve, and tried to reflect on what the role of government is. That is to provide services that can't be provided or shouldn't be provided by anybody else. With this thought in mind, and thinking about our special interest groups, that are those consumers who sometimes have a difficult time using our system, we wanted to make that beneficial for them.

So we looked at system throughput as our biggest chunk at 35%, and the two that go together in the Traffic Safety and Security region are 15% for Security and 20% for Traffic Safety. That is involved in the EMS system and the Law Enforcement to Cellular phone responses, Changeable Message Signs, and those type of things that benefit those.

Moving of Goods was 10%. The Integration of Transportation Modes - 10%. Environment - 5%. And Tourism was 5%, because of Michigan and our responsibility there. Government should be very involved in the marketing aspects and making the public aware of the ITS system and how it is improving the lot of life and a lot of transportation here in the Southeast Michigan area. We had a better marketing technique to get information out there with our public elected officials and that whole system and our successes there. So that's why we put 10% in the awareness component.

OSCAR VILLALVAZO, JR., ROCKWELL INTERNATIONAL (RESEARCHER-AEROSPACE): Just clarity for the security again?

JIM BOLGER, MICHIGAN STATE POLICE (FEDERAL & STATE GOVERNMENT-ENFORCEMENT): From our perspective it's the security of Law Enforcement, EMS, Police and Fire, responses of that type. As the automobile manufacturers were talking about as some of their issues.

MORRIE HOEVEL, FEDERAL HIGHWAY ADMINISTRATION, LANSING (CONSUMER-GOVERNMENT PROCUREMENT): Well as consumers we've got, talking about the public, the normal traveler, the commuter on the road, the owner of a public/private commercial vehicle fleet, and government procurement. The things that we are most interested in, the two most important things were the variation in travel time. How long does it take me to get there? If I know how long it's gonna take me to get there, I can plan for it. I don't want to be late for work. The employer doesn't like that. I don't want to be early for work, because I don't want to give the employer any more than what he deserves.

Safety and Security: We lumped those two together. They are a concern to everybody. Safety as far as accidents and collisions. Personal security in terms of being able to report maydays and breakdowns.

The other three: Integration of the Modes. We feel like that we would be interested in, or at least consider, using other modes of transportation, if they were integrated somehow, if we were assured that we would get to go from one place to another on different modes, we could select the most reliable one. We're looking for [an opportunity] where we might go half-a-trip on one and half-a-trip on the other.

Industry competitiveness. As far as the consumer, we are quite interested in that because the more competitive the market, the less we're going to be paying for our products, and the other thing is shared infrastructure. When we talk about private and public en-route driver information systems, for instance, we prefer not to have to pay for two infrastructures. We'd like to combine those two and have the same infrastructure serve both our interests.

DONALD ORNE, P. B. FARRADYNE (RESEARCHER-CONSULTANTS): For clarification, the 20% on intermodal integration, was that an easy consensus in your group? It seems awfully high.

MORRIE HOEVEL, FEDERAL HIGHWAY ADMINISTRATION, LANSING (CONSUMER-GOVERNMENT PROCUREMENT): Mac was a big promoter of that. I think what it came down to is that we might've run out of time, and we were trying to assign something.

MAC LISTER, SMART (CONSUMER-PRIVATE TRAVELER): Let me comment on that, Don, if I might. I kind of personally wrestled with that. About whether I was bringing a public transit perspective to our roles. And a couple of things influenced me. One was the statistic Al gave yesterday about how 35% of people who do not own cars. They are in fact personal travelers. Whether in fact they have a car or not.

Secondly, there's an article in the current ITS Quarterly that shows a study that says that literally 35% of people, not a selected sub-group, but non-public transit users, 35% of them, if presented with proper public transit

alternatives to them, with good information, viable and safe and secure transit, would consider public transit alternatives. Keeping that in my head, I don't think I overstated the public transit perspective to that role.

MORRIE HOEVEL, FEDERAL HIGHWAY ADMINISTRATION, LANSING (CONSUMER-GOVERNMENT PROCUREMENT): From the Federal Government perspective, we are pleased to see that sort of thinking. You know, we acquired 10-15% of ours to that same thing. We picked part of ITS to better integrate those modes.

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B): One thing that surprises me is that the consumers don't seem to be sensitive to cost. No where on that pie chart is this shown.

MORRIE HOEVEL, FEDERAL HIGHWAY ADMINISTRATION, LANSING (CONSUMER-GOVERNMENT PROCUREMENT): The competitiveness is what we are showing as reduced costs to us. Markets are competitive if industry can get their products to market on time. Supposedly that will result in lower costs for us.

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B): You don't see any entry threshold for costs for things like safety and security, or intermodal travel. If Mac says that the fee is $10 to go down the block, that's okay with consumers?

I would personally perceive that there should be some sensitivity of entry into those elements of costs vs. benefit or value to consumers.

MORRIE HOEVEL, FEDERAL HIGHWAY ADMINISTRATION, LANSING (CONSUMER-GOVERNMENT PROCUREMENT): I don't know if we looked much at costs.

TOM WISSING, EATON CORPORATION (TELECOMMUNICATIONS/ELECTRONICS-**AUTO SUPPLIERS):** To respond as a consumer, I want all that stuff for free.

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B): Dream on.

BOB ERVIN, UNIVERSITY OF MICHIGAN (FACILITATOR): Well, you could look on the cost question as resources. The consumer has resources, and the consumer is trying to accomplish something with his resources at the minimum cost. If he accomplished safety and security, he might minimize his travel time. Then the guy that can give him the greatest yield for the minimum cost is simply always what he'd want to do. So you could still accept all of Morrie's pie chart, although the fact that he's interested in industry competitiveness.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL **GOVERNMENT-REGIONAL):** Myself, I know that when I try to consume services or goods, the first thing I do, is go to the phone book, and make a list of all the companies that I want to look up and see if they are in the area, what services are offered there, and try to figure out who has the lowest cost among those service providers that are goods providers, and then try to either get there, or figure out where they are, ask where they are, and all that. I didn't see anything up there in that regard, and it looks like you were focusing on consumption of ITS products, rather than consumption of goods in general. I don't know if that was a distinction that you made within your group, or if that's something that just seemed to be overlooked.

For me, for instance, I would've chosen broadened travel opportunities, or something like that. It more defines I can now access Macomb Mall because I-696 is there. Now I have a broadened market for opportunities over in that side of the world. And ITS may provide something like that for me.

MORRIE HOEVEL, FEDERAL HIGHWAY ADMINISTRATION, LANSING (CONSUMER-GOVERNMENT PROCUREMENT): Cost is low tech, you know. We're thinking about high tech solutions to this, and cost is low tech.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): Steve, I don't know where you are going to go with these things as a continuation, you put something up there, Morrie, and it's not what I expected, and maybe you'll think about changing it. That's one scenario, the other scenario is, if we're really going to go on with this, and that's the baseline for what the consumer is saying, and we're dealing with a deployment, is there a possibility that when we're looking at some assumptions and pie charts, and it doesn't have the right elements, and then we go off and build this thing, and we get further down the path, and then we say oops, I think we missed something. I don't know where you are going to go with this.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Let me tell you where we're going with this. This is a kind of a qualitative approach that we're taking to get things started off. We would like to have you refer to these charts when you present your deployment, and talk about how your deployment meets these objectives. Each table is going to decide what modifications to the Strawman you want to make in terms of service area, and in terms of equipment and infrastructure, and we want to know why you would want to make those, and if these are indeed your benefit areas or objectives, then it seems logical they would be justified on that basis.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): I was kind of coming from this a little bit differently. Of all of those that are going to point to deployment, the consumer one is important. The leisure and all that other stuff, that one wasn't on that chart. I think you could put it down as variation or safety, but it didn't come across so we'll create a deployment that goes up and tries to satisfy that pie chart, because of all of them, that's where we're gonna end up going. My point is that the target may be in the wrong direction. There may be another piece there and I don't know how that's going to work.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): First of all, none of this is fixed. This is our deployment, and if we don't think some objectives are correct, you are allowed to change your objectives. You don't like the deployment looks, you can change it. This is really gonna be flexible. That's a good point, and we should talk about the changes. Maybe not everybody agrees the changes you might recommend, but it should be brought to the table.

[3. Facilitator Introduces a Strawman Deployment Plan]

STEVE UNDERWOOD, UNIVERSITY OF **MICHIGAN (PROJECT** DIRECTOR): The next two steps focus on the Strawman Deployment, and we've got Tom, Mark, and Lisa here busy putting up the Strawman deployment that we're going to address for this morning. What I'd like to do is again go over the approach that we're using here with the maps at this time, and then give you a break so you can come up and take a look at the maps, and so that we can kind of regroup here and see where we are at, and then you'll be asked to come back and put together your own deployment plan to finish out the morning. I want to go back to the matrix diagram that I was using earlier today, because this is really **the fundamental approach that we're using** where we have services that can be provided. In this case, the services are presented by the wedges that are around the map. You are familiar with them from last night, they are the same ones. Public, Public-Private, Private, and Public and Fleet. And these are cross-cut in the matrix here by selected subsystems. And I show surveillance here, and roadside information systems. Well, the matrix is shown here around the circle by the different colored boxes. It is split into two areas. On the inside of this black line, is the infrastructure related subsystems. We have control centers, roadside communication, surveillance, and traffic control. These are things that you actually deploy in a geographical region. Outside the black circle we have vehicles, the traveler for traveler information systems, payment subsystem, and an institutional subsystem. So these are things not necessarily deployed geographically but they do support ITS. We've taken a little bit of a stretch to include institutions and payments as subsystems, but we're doing some of that in the architecture too. I know the Rockwell architecture had an institutional subsystem.

[Again, the ITS Services Coverage Map for the Strawman Deployment Plan and the ITS Subsystems Deployment Map for the Strawman Deployment P/an are given as Figures 5 & 6, respectively, in the ITS Deployment Exercise Summary Report. A description of the ITS Services included in the Game and Seminar is included in Appendix E of the Summary Report. A description of the ITS Subsystems included in the Seminar is given in Appendix G of the Report. Charts *supporting the Strawman Design for the 7 7 Services are shown in Appendix H of the Report.]*

These are devised to get you thinking also about the architectural approach that you'll be taking. The architecture, the National **Architecture, is fundamentally a division** of the services into subsystems, and the interactions of those subsystems. This is where we are bringing in some of the architectural thinking into our activities here. The question that this matrix answers is: How are you going to do this? How are you going to provide surveillance for traffic information? And I took a stab at preparing a Strawman that I don't want to defend too hard, but it is a starting point, just so you can see how this matrix is going to work. We have nice little icons that are going up right now, but there are words in each one of the cells here that describe my design for ITS.

For example the Public En-route Driver Information System. In terms of infrastructure what this calls for is message composition capabilities at the Center, Highway Advisory Radio Roadside Communication capabilities. In terms of surveillance it relies on cellular call-in, video observation, and

installed loops. In the traffic control area we have changeable message signs. I used information and control and put them into the same category, so traffic signals and changeable message signs are in the same category from this interpretation.

The second question you want to ask on this diagram is: Given that you have all of these things, where are all of these things in existence? A public en-route driver information system like Highway Advisory Radio depends on having the roadside communication component, and all of these depend on having it geographically deployed. So let's move to the map now, and we have identical circles in each one of our defined deployment areas. Some of these deployment areas are cities and towns and counties, composed mostly of surface streets, but they also have some state roads going through them. This circle, for example, is a circle for deployment for Sterling Heights. This one is for the Troy area, and this one is for the Rochester area. The question you ask is: Do we have en-route driver information systems deployed in Sterling Heights? And the answer is no.

The way that I know that: I look at which ones are filled in. For Sterling Heights there is nothing filled in for En-route Driver Information Systems because nothing is there. In this case, it is probably the highway advisory radio is just not in place. Or there is not adequate surveillance. Also, the freeways are indicated in block essentially, so we have I-696 East from I-75 to I-94 as a block of potential deployment, and the services that are provided from here are indicated within this block area. So, going back to this matrix, the concept is that we have a variety of services provided by subsystems, and in order to provide the service, you have to have all the correct subsystems filled.

I've taken a stab also at identifying the candidate subsystems, so there are these dots on the outside of these wedges indicating them. For en-route driver information, your concerns would be what's in the vehicle, institutional arrangements, centers, roadside communication, surveillance, and traffic control. For en-route information, you are not as concerned about the traveler being at home or being at work, because we're talking about en-route. Because this is a public service, we are not as concerned about the fee for payment so we've checked off certain candidate subsystems that would apply to each one of these services of this part of the Strawman.

This is designed for the 1O-year scenario, taking into account existing deployment. Existing deployment includes the DOT plan deployment, and existing FAST-TRAC infrastructure. That's primarily what we are looking at.

Ten years from now, I made the assumption that most of the services are provided in their appropriate places. Meaning that if the service is a service that is normally provided on a freeway, well then most of the freeways have it ten years from now. If the service is provided on surface streets, then most of the surface street areas have it. Most of the jurisdictions have it. Adaptive traffic control is not in every region, or city, or locality, but it is in many of them ten years from now. That may or may not be right, so what I'm looking for is corrections to this in the ten-year scenario.

JAY ASEL, AMERITECH (TELECOMMUNICATIONS/ELECTRONICS-COMMUNICATIONS): I wish to ask for clarification. There are a lot of circles in there. What was the logic that you used to put one circle in there, and how to fill it out again? What drove you to do that?

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Okay, the way that I approached it, when I did this myself, is that . . .

OSCAR **VILLALVAZO, JR., ROCKWELL INTERNATIONAL (RESEARCHER-AEROSPACE): Pick any one of those** dots up there.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Oh, let's say Sterling Heights. Lets start there. How **did I fill in that dot is your question?**

CHIP **WHITE, UNIVERSITY OF MICHIGAN (RESEARCHER-UNIVERSITIES):** And also why did you **put** it there?

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): The reason that I put it there is that I wanted to identify logical deployment areas that we could address as an entity, and it seemed to **us that the two kinds of logical deployment** areas were segments of the freeway between other freeways, and local areas, and local areas are presented in a couple of ways. One as counties, and as the actual cities. For example, I know in Oakland County, the Road Commission for the county has a lot of control over the traffic, over the implementation in that area, so decisions could be made for the county, perhaps. On the other hand, other counties are broken into the local cities, and decisions are made at a local city level, but we had to have kind of a unit of analysis for the surface streets, and that's what we picked, the local.

OSCAR VILLALVAZO, JR., ROCKWELL INTERNATIONAL (RESEARCHER-**AEROSPACE):** I guess where I was coming from is the first square you have there. If there is nothing but just residential homes in that block, I would see that consumers need more communication of ITS different than if that was all industrial, and that's the part I that came to my mind. Is that what you did?

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Yeah, I thought what does this area look like, what does this city look like, and what is the likelihood that there would be something deployed in this area, for this city given the population as I am familiar with it and land use.

BOB ERVIN, UNIVERSITY OF MICHIGAN (FACILITATOR): Steve, if I could offer, I think one thing that may be convenient, is to think about Steve's Strawman and then later you can think about your own suggestions. Imagine that each of the fourteen areas are effectively the same size except that Detroit is about three times as big as the others. But where is says Romulus, Sterling Heights, and Dearborn, and Troy, imagine if you simply take all of them geographically, and carve them up into essentially equal area lumps. Now it's true, Oscar, that some of them are more industrialized than others, and you have to sort of know the community. If you thought you might speak to the differences in them. And it may also be convenient to look at the freeway links that Steve's got there as more or less equal length. They are about ten miles each or something like that, so it's not good to make profound distinction between

them. You get all wrapped up in details. Just think of them as blocks of land, and there are blocks of major road links that we're talking about covering with something, so as to deliver services.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Later this afternoon, after the break, we're gonna ask you to do several things. One is we're gonna ask you to limit yourself to a set of three to five services that would be important to your perspectives. Because we have to put some limits on this, and this one of the limits we are putting on it.

Second, we're going to ask you to modify the matrix that I put together. In this sense I feel pretty lucky, because you are going to correct me, and make sure that I'm right. And here what you are doing is you are placing equipment and infrastructure in the cells of the matrix indicating how this would be provided. That's Step two.

Step three would be given that this is how it is provided, and given that we have existing deployment including FAST-TRAC and the State of Michigan, where would we be in terms of the deployment ten years from now and then you can color in the circle.

IVY **RENGA, CHRYSLER CORPORATION** (AUTO MAKER-COMPANY B): When you said the word equipment, you threw me because equipment to me means technology. I thought your circles there represented services to that geographic area, not equipment. For example, I could provide service in Sterling Heights using HAR, a very local technology, or I could provide service to that entire area using wide-area technology.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): So equipment will be provided by the subsystem. And there will be equipment in the vehicle. There will be equipment in people's homes, like televisions, and telephones at the work site, and there is going to be infrastructure hardware and software at the centers at the roadside for surveillance and for traffic control. So one of the things that we want you to do is to take a look at what **I** have in the way of equipment and infrastructure or technologies in these cells, and see if you think that is a reasonable approach to provide that service.

For example, Public En-Route Driver Information. Given this design that you've come up with, where would this service be provided geographically? If it was a broadcast medium, as long as drivers have cars that are updated, it's everywhere. Also, I like to point out that instead of coloring in all these little dots for things that are everywhere, we have a key for those services also, that are just all over the map. At the regional freeway surface street level, on our Strawman here, what we have is emergency services management on all surface streets. We have pre-trip traveler information on all of the surface streets. We have en-route driver information on all of the surface streets given our architecture in the ten year time frame. But this just makes it so you can either color in all the boxes here, or you can just focus on surface streets, freeways, or for the entire map.

ED GREENE, FORD **MOTOR COMPANY (AUTO MAKER-COMPANY C):** From your information, what are you calling en-route driver information? You got a slot up here, en-route driver information down here, and you just said the example that it's going to be on al l the surface streets?

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Yeah, so I picked private because these wedges here are orange, they are the private services, and there is private en-route driver information that you are talking about.

ED GREENE, FORD MOTOR COMPANY (AUTO MAKER-COMPANY C): What is that? You've got a payment definition, but you don't have any roadside communications, so it's got to be totally contained in the car.

TOM REED, UNIVERSITY OF MICHIGAN: There are definitions on page 23 of your binder. These are the definitions we went by for the services. And then subsystems follow on page 24.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Tom's finding the definitions for each one of the services.

TOM REED, UNIVERSITY OF MICHIGAN: Right, those are the definitions that we went by, and you could argue whether those are the right definitions or not.

ED GREENE, FORD MOTOR COMPANY (AUTO MAKER-COMPANY C): If you don't have communications, what are you charging the guy for, every time he reads the CD-ROM?

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR):. There are communications.

ED GREENE, FORD MOTOR COMPANY (AUTO MAKER-COMPANY C): It is not marked there. You haven't indicated that it is included.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): It's implied. Everyone needs to know this. Communication is possibly provided between each and every subsystem. So when we went through this, we found that there was a redundancy in our indicators for communication, and that it would require a lot of room to show the communication vehicle. Redundancy was in the transmitter or the receiver usually indicate at the site what kind of communication medium you were using. We also felt that the only real question about communication was at the roadside vehicle communication, so we decided to explicitly pull out the roadside to vehicle communication, but ail other communication is implicit in the transmission or

reception device in some of the other subsystems. For example, if you have a cellular telephone in a car, you know what kind of transmission is being provided, and reception is being provided, you know the communication system that is being provided there. So it is implicit in the reception and transmission devices that you are using. Follow me on this?

So to answer your question about en-route driver information, the surveillance is based on call-in video and airplane surveillance, and the vehicle has RBDS in this case, a guidance display, a display to show information, and implicit in here is that you have probably FM-sideband communication broadcast to the vehicle for the RBDS capability. That's what I have there. You may not agree with it, you may believe that roadside communication is more appropriate approach. You could put that instead.

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B); How do we make a change to your diagram?

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): You are gonna get a diagram like this for your table. We're going to ask you to select three to five services to work on. I'd like you to start by working on your most important service first. In this case, we have in-vehicle signing, and real-time hazard warning, which is a public private service. And we also have provided the different mechanisms or technologies for providing this, which include the vehicle, payment traveler center, institutions, communications, surveillance, and traffic control. The way that you make the changes is that you take what we have as a baseline and essentially check off what you would provide in its stead in the way of technology. So I am using in the vehicle a receiver, as far as communications or rather institutions we need public-private communication, and interjurisdictional cooperation and in this case tags for traffic control and it is provided in these areas that are circled. And so the question that you would be answering given that we have this for you as a Strawman: Would you change any of these items?

Now, this is the task that I'm asking you to do. I think it is a doable task. In the beginning it may be somewhat confusing, but when you get into it I think you'll begin to understand exactly, but again, what we are interested in is not so much your final design, but why you would suggest that final design. After you make changes to the various subsystems and services, we'll be asking you to get up as you did before to make presentations for each one of your services, and how you would be providing this in the region. Let's take a break. During the break, stretch your legs, but also come up and take a look at what we have up here.

KUNWAR RAJENDRA, MICHIGAN DEPARTMENT OF TRANSPORTATION (FEDERAL & STATE GOVERNMENT-STATE): What assumptions are you asking people to make, or do they make their own assumptions to prepare the Strawman, or modification of the Strawman, concerning resources, risk, and whatever else?

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): I'll go into that after the break.

[BREAK]

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): All right, I need to know which services were selected. I'm going to start with the auto makers tables. Ivy, can you give me the services you selected?

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B): We selected three services. In-vehicle signing, and real-time hazard warning. Commercial vehicle electronic clearance, and en-route driver information. Private.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Okay, the next group.

JIM BOLGER, MICHIGAN STATE POLICE (FEDERAL & STATE GOVERNMENT-ENFORCEMENT): En-route driver information; public. Coordinated Adaptive Signal Control; public. Emergency Services Management; public.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Okay, consumers?

PAUL LESCOE, US ARMY TANK/AUTO COMMAND (CONSUMER-COMMERCIAL **VEHICLES):** We're doing public en-route driver information, private route guidance and navigation, and commercial vehicle electronic clearance.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Okay, thank you.

BRENT BAIR, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERN-MENT-COUNTY): Yes, we've got coordinated and adaptive signal control. We've got public pre-trip traveler information, and emergency service management.

STEVE UNDERWOOD, UNIVERSITY OF **MICHIGAN** (PROJECT DIRECTOR): Okay, telecommunication and electronics.

TOM WISSING, EATON CORPORATION (TELECOMMUNICATIONS/ELECTRONICS-AUTO SUPPLIERS): We got Mayday, and En-Route Driver Information.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Public or private?

TOM WISSING, EATON CORPORATION (TELECOMMUNICATIONS/ELECTRONICS-AUTO SUPPLIERS): Private.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): All right, researchers?

CHIP WHITE, UNIVERSITY OF MICHIGAN (RESEARCHER-UNIVERSITIES): In this order. Emergency services management, commercial vehicle electronic clearance, and Mayday.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): All right, and the interest groups?

RUSS GRONEVELT, WAYNE COUNTY DEPARTMENT OF PUBLIC SERVICES **(INTEREST GROUPS-ENVIRONMENT):** We have coordinated adaptive signal control. Paratransit operations management, and pre-trip travel, private.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Well, we're all over the map on this one.

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B): This in itself makes an interesting matrix of the action groups represented vs. their interest in the deployment.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Yes. All right. I need this in order to help us provide you with the Strawman, and so we're gonna kind of mark those up on diagrams similar to what you have.

[4. Perspectives Select Three Services and Suggest Modifications to the Strawman]

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): What I'd like you to do starting now is to discuss the matrix that you have on your color diagrams for each one of the services. Each one of these diagrams should be targeted toward a service, so if you'd write the service name up in the upper top right hand corner. The way that I would proceed, would be to look at the different subsystems, think about how you would provide this information or service, and then after you've decided how it would be provided, then the question is where it is provided. As you are doing this, we will be

placing up diagrams of the Strawman as we have it and you'll be able to make comparisons. But I'd like you to get started, and we'll start preparing the Strawman as you've indicated.

Are there any questions about how to proceed in a general sense? You have facilitators at your table that should be able to get you started on this, but if there are any general questions, I'd be willing to answer them.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): What if there are other ways of doing what you have up there. Do we add them?

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Oh, yes. Certainly. So if there are other technologies that I haven't looked at or aren't on the list, make up your own. In fact I think we have blanks in order to accommodate those on the wall chart. That's a very important point.

BOB ERVIN, UNIVERSITY OF MICHIGAN (FACILITATOR): Steve, should the groups put the name of their institutional group on the . . .

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Also, please put your perspective name on the top so that if these get shuffled around a bit, we'll be able to tell who they belong to Ivy?

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B): Something I think we talked about during the break. In our opinion, the geographic area of Southeast Michigan as defined by the charts here is too confining. I think from our perspective of what Southeast Michigan is, is it's something that is east of Ann Arbor, and goes beyond Pontiac.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Yes, that's a good point, and so I'd like people to listen to the response to that. Again, we're trying to be flexible on this and we do have ways of representing what goes on outside, and I put this here for Ann Arbor. If you don't like the way I broke up the jurisdictions, fine, cross them out and move them. If this doesn't seem appropriate if you provide a justification, we're here to learn about the real deployment. I don't want to be imposing any artificial constraints on you. So yeah, go ahead and expand the area you'd like.

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B): I mean, just to be realistic I think that's what we have to do, because the current work that is being deployed now

like FAST-TRAC and SCATS and so on, is looking at an area beyond the area defined on your chart. And that's today, not ten years from now.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): You know what I'd suggest that you do, is that we have this other circle up here called regions, and if there is something is applied to things here plus in the outer regions, just give an indication of that, and that's how it will be noted.

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B): I mean, an aid to you might be if you had a map of this corner of Michigan, then maybe we could draw the boundaries of where we felt Southeast Michigan was according to our definition.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Okay, I could draw something like that.

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B): That way, you'd have an input from a variety of perspectives, as what is, in their minds, Southeast Michigan. Because I have a hunch that there is three or four different visions of what Southeast Michigan is.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Okay, all right. I'll provide you with that.

[FADE OUT, NO MENTION OF LUNCH]

[LUNCH]

*[A PORTION OF PROCEEDINGS WAS NOT **RECORDED]***

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): [FADE IN] ... differences are. Also, you might want to spend a few minutes talking about who is going to making the presentation and assuring that all of these points are covered, including the identity of the services, the service area, and especially for those of you who are adding things to the plan, Where the resources would come from, in order to add the things that you are suggesting. We're going to go into another phase where we're going to add some constraints to this, but I'd like you to be thinking about that ahead of time. So, five minute;

[BREAK]

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): I'd like to ask you to come up and make the presentations. Let's start with Oscar Villalvazo and the Research Group.

[Participant-suggested modifications to the Strawman are given in Appendix I of the ITS Deployment Exercise Summary Report.]

OSCAR VILLALVAZO, JR., ROCKWELL INTERNATIONAL (RESEARCHER-AEROSPACE): No food jokes, right? Okay, we're part of the research group, and one of our thrusts in terms of priority was a revenue stream, leadership, knowledge base, and talent pool. We did this, and we kind of forgot what that was and we went off and did the priorities for emergency services, and I don't think we've really had a chance to go back and say, "Is what we did here really validated back to what our key thrusts were?"

So, we'll see if we can't ad-lib that part. We had three major areas. Emergency services **management, CV Electronic Clearance, and** Mayday. And we prioritized them in that fashion because of Deployment. What could we get deployed out there as quickly as possible so that we could begin to generate some form of revenue, and I will assume that as that revenue builds, we will build some kind of leadership and clout, and also find out that Oops! we need some knowledge base things like algorithms and people that can program things and go out and find the talent pool.

So, from an emergency services standpoint, we believe that a lot of the elements really in terms of surveillance are fairly well in place, or will soon be in place, both with the RCOC and the MDOT project coming on board. The

key thing is that a lot of this is kind of probe-type sensors or information out in the field. The backbone, for all of that deployment is the communications. How do I get a large coverage area like Southeast Michigan communicated? And we'll be using microwave technology, but what I found out was that we didn't have fiber in there. And so we added fiber as part of the communication medium. And fiber here can also include telephone, which we use.

And then you couple these two together with some kind of dispatch center that consolidates that, and now what you have is the information going to the private sector, either through radio, and you may have also some display information. One of the elements that we discovered was that it is multiple-technology. Emergency is not a one-thing where it's just one location--it's got to be the whole network, the whole region.

Probably we can rapidly deploy that because we have some partial, but the thing that is probably keeping us from doing a good job is the jurisdictional boundaries. All the legal communities, the politics that are involved. It's my area, and all of that stuff, is probably the biggest Achilles Heel with that. Did I miss anything with that, Chip?

CHIP WHITE, UNIVERSITY OF MICHIGAN (RESEARCHER-UNIVERSITIES): One thing to notice is that the dispatch is regional.

OSCAR VILLALVAZO, JR., ROCKWELL INTERNATIONAL (RESEARCHER-AEROSPACE): And the jurisdictional issue is a biggie in terms of the implementation. And the funny part about that is that it was not so much money, but politics related.

Okay, I'll try to go on to the next one. Commercial-vehicle electronics is a little bit of a narrower band. It deals more with the trucking company, not the general public at large. And we also found that it is centered around the main interstates, either I-75 or into Canada. Because it was contained, and because Dr. Rajendra told us yesterday that Advantage 75 was going well, which is part of that element. A lot of those things are kind of beginning to be in place. You need the weigh-in-motion, some kind of microwave. Some kind of way of packaging the message, tags. You got the jurisdictional one here. It's not so much in terms of all of the public, but it is more related to the trucking industry and the government in terms of how regulations are covered, and it also effects the public/private sector, mostly in the carriers.

The barriers, once again, are jurisdiction, standardization of the tags. There is a variety of them, and then it is limited basically to freeway or major quarters, where goods get transported.

The last one was Mayday. What was really interesting about the first one, the Emergency Services Management was kind of the infrastructure to support Mayday. By the time we got to Mayday, we said that all we needed to know was to get the jurisdictional issues taken care of like who responds to what call when you have a Mayday. Tow truck. Private citizens, basically, it's awareness. You are packaging the data, its users, cellular phone two-way telephones, and then transmitters, and it's all regional. That's it. Any questions?

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Okay, let's move on to Telecommunication and Electronics.

TOM WISSING, EATON CORPORATION (TELECOMMUNICATIONS/ELECTRONICS-AUTO SUPPLIERS): Well, we've got Mayday in mind. We'll give you a little more clever of an approach to how we decided we were going to handle this. Essentially, we first looked at the vehicle. What do we need to know? We need to where the vehicle is, so we need GPS. How we gonna communicate with the vehicle. We're going to do it audio. And we need to communicate, so we have either a two-way radio, or a cell phone. We need to buy some equipment, and a I-900 number so you pay as you use. When you have an accident or an incident, you pay a $25 call or whatever you are going to do, so you just pay if you need it.

And it's got to be expensive, because you don't want to push the "Cry Wolf" button. We need some dispatch. It's a public and private enterprise, and we're going to use the cellular network and deploy it all over.

Now, the other one gets a little bit more complicated which is the en-route driver information. Again, here we're trying to take a low-cost, quick deployment type of approach. We need to know where the vehicle is, and we're going to communicate to that vehicle via audio, no visual, or no map database, and the reason that we need to know the GPS information is that what we're going to do is send a coded message so that as we drive down the highway, my vehicle knows that I'm on Telegraph Road, and I'm not on the East side on Jefferson, and so I'm only going to get those messages that pertain to my area. We're going to use an FM side-band on our RBDS. It's sponsored, it's also paid for by taxes, and we need to buy some equipment. We need the radio, we need someone to compose the messages, and then put them in a reference or another code, so that it goes in area one, two, or three, or whatever it is.

We need surveillance, we don't think we need anybody else. We need surveillance, and we thought about that and talked about that for a while. We don't need video, we think we can do it with call-in, loops, and then aerial as a supplements on nice days. And we're going to deploy it all over. So when we looked at these areas and benefits to us, we feel that we hit on the test bed, that was the big thing. We only gave ourselves a half a star for joint development, because we are using existing infrastructure, and a lot of existing equipment, so that there is not too much equipment to be added, and we're going to use the telephone system, and we might get a little income out of it, but that's not important to us.

MAC LISTER, SMART (CONSUMER-PRIVATE TRAVELER): Is this public or private?

TOM WISSING, EATON CORPORATION (TELECOMMUNICATIONS/ELECTRONICS-AUTO SUPPLIERS): Yes, this is private.

MAC LISTER, SMART (CONSUMER-PRIVATE TRAVELER): Your means of getting messages to the traveler was by a radio?

TOM WISSING, EATON CORPORATION (TELECOMMUNICATIONS/ELECTRONICS-AUTO SUPPLIERS): Yes. FM sideband. It just comes in on your FM radio.

MAC LISTER, SMART (CONSUMER-PRIVATE TRAVELER): How would you provide yellow pages type information?

TOM WISSING, EATON CORPORATION (TELECOMMUNICATIONS/ELECTRONICS-AUTO SUPPLIERS): We ignored that. It was on there as though it was a "Oh by the way, you are going to have this anyway" type of a statement on there and we decided we were not going to provide yellow pages and we just ignored it, because we thought it was more important to have this.

JOSEPH SAUL, INFORMATION TECHNOLOGY DIVISION, UNIVERSITY OF MICHIGAN (INTEREST GROUPS-CIVIL LIBERTIES): So when you're driving along, what happens is that your car simply only tells you about the messages that correspond to where it knows itself to be.

TOM WISSING, EATON CORPORATION (TELECOMMUNICATIONS/ELECTRONICS-AUTO SUPPLIERS): Correct. So we don't get fuddled with everybody else's messages. Now if I'm going to the other side of town, how do we handle that?

JOSEPH SAUL, INFORMATION TECHNOLOGY DIVISION, UNIVERSITY OF MICHIGAN (INTEREST GROUPS-CIVIL LIBERTIES): That's what I was going to ask.

TOM WISSING, EATON CORPORATION (TELECOMMUNICATIONS/ELECTRONICS-AUTO SUPPLIERS): Oh, I'm sorry.

JOSEPH SAUL, INFORMATION TECHNOLOGY DIVISION, UNIVERSITY OF MICHIGAN (INTEREST GROUPS-CIVIL LIBERTIES): That's what I was going to ask. I mean if I know that is important to me to know what the traffic conditions are like in Troy right now.

TOM WISSING, EATON CORPORATION (TELECOMMUNICATIONS/ELECTRONICS-AUTO SUPPLIERS): There will probably be an All button or something of that nature, where I could get 'em all. So you could either get your area where you are in, or all.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Thank you. Local government.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): Well, our focus was on our two primary goals of System Throughput and Enhanced Safety, although the others of course were considered. Of the three services that we are going to be providing, one of them in support of the service goal is Emergency Services Management. We looked at basically an incident management model when we put this together, and afterwards we thought maybe that's not everything there is to it.

But using that as a model, we thought we then needed surveillance to identify the incident. We have probe information, call-ins, loops, and video detections or general incident detection capabilities. Then we also have after that the verification, which uses the same sorts of capabilities. Then of course we go into a response mode, and what that means is not only contacting the appropriate emergency service providers via a number of means communication-wise, but also moving into a response mode from a traffic management perspective. Keep people out of the incident area, and that meant (and it wasn't shown on Oscar's slide) Adaptive Control and Ramp Metering strategies to keep the people out of the area. The one thing that we did

overlook was other types of emergencies like when some somebody calls from home. My mom fell down, broke her back, or something, she can't get up, or one of those such things.

We did note, in terms of travelers, on the Strawman there is a phone connection there, and that probably means the home-based phone system. We got a little confused on the vehicle side. Not just confused, but there are two elements to this. One is that you have the emergency vehicle itself that needs the two-way communications to the dispatch center, but also there has to be what we felt was a mobile data terminal, and we don' t know if that was the display in here, or what that was. It wasn't shown there, but I think it probably handled that capability. Also, we thought how do you guide vehicles around and divert them around the incident. So there is some route guidance capability there. As you see in the center, we have route guidance capability, but we also have the ability to provide the emergency services with the best routes to get to the emergency. And of course that would be region-wide we' re talking about.

Coordinated Adaptive Signal Control. We're looking at that as being a community-based service, but we're looking at all the cities in the Metropolitan area having that capability, ultimately within the 10-year period. At least in some form, minimal, or only along certain specified corridors. For instance, what we don't make a distinction up here on is the major surface arterial streets, vs. the minor arterials or the collectors, and we would see that at a minimum, we would have to include the major arterials, the trunklines, Michigan Avenues, theTelegraph Roads, and things like that, Kunwar?

Again, what that entails is a great deal of surveillance information to provide the adaptive control, and we see that coming from a number of different areas, particularly the sensor equipment, the infrastructure based sensors, but also probe vehicles, as we are doing in FAST-TRAC or we hope to do in FAST-TRAC. And a communications infrastructure that allows us, then, to retrieve that data, send it to a traffic operations center, manipulate it to provide the adaptive control. I didn't get into how we'd pay for the last service, but in this case, it's primarily government funding to put in the adaptive control with maybe some minimal level of private partnership, for instance, for the communications infrastructure. Again, we show a land line, a fiber telephone line, or whatever we thought was an oversight, so we added it in there. In terms of the vehicle-based systems, of course we're looking at least in Oakland County, a beacon-based system of probe vehicles, and at this point, and maybe expanding beyond that in the future.

You might note that there is a little note on the corner: the integration of systems is really not considered in this model. We had a hard time here, because some of the information we receive or would receive is filtered; it's surveillance information, or it's fused information from a variety of sources and then filtered. And I'll give you an example. An alarm from the Michigan Department of Transportation that an incident is occurring on the freeway. We would get an alarm, and maybe even a wysiwyg type pop-up window, showing the message on a variable message sign on the freeway system. What would happen once we received that alarm, this is an input. It's not a sensory input, you might say, but it is an input from another organization. It' s more in the institutional area, where

we've enabled systems to talk to one another. What we'd use the input to do is enact a special traffic signal timing plan, and have the signal system adapt to that particular influx of traffic off the freeway onto our arterial roads system, so things like that aren't really included in this model.

DONALD ORNE, P. B. FARRADYNE (RESEARCHER-CONSULTANTS): Question before you go on. The presentation so far is centered around building upon what was already existing, and the thing that occurred to me in listening at this point is that we have infrastructure systems that we built for another day that no longer apply to current demographics, signals being one example. Michigan Avenue being a particular example. Is it implicit in your plan that you would go back and fix what is wrong with what presently exists?

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): Yes, and particularly on the major arterial roads, like Michigan Avenue, as an example. Like Woodward, Ii ke Cratiot. The major thoroughfares in the Metropolitan area, primarily.

RUSS GRONEVELT, WAYNE COUNTY DEPARTMENT OF PUBLIC SERVICES (INTEREST GROUPS-ENVIRONMENT): I've got a question, Jim. You are talking about all of these cities being integrated, but Romulus?

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): No. We said everybody should be in there. And the Strawman did not include Romulus. That was a note from our facilitator. We said we're on target with the exception of Romulus, which wasn't included in the Strawman, and we said that was important because that is where the airport is.

RUSS GRONEVELT, WAYNE COUNTY DEPARTMENT OF PUBLIC SERVICES (INTEREST GROUPS-ENVIRONMENT): I assume that it would be a really to do those with communities through those areas in Wayne County, because of the lack of a center. You are thinking that they would have a separate center, each one of those?

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): No. Not necessarily. There is currently a center in place in Detroit, that will probably have the capability of providing what's necessary for adaptive control in Wayne County for . . .

RUSS GRONEVELT, WAYNE COUNTY DEPARTMENT OF PUBLIC SERVICES (INTEREST GROUPS-ENVIRONMENT): All of Wayne county?

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): I wouldn't doubt it. I don't see why not.

KUNWAR RAJENDRA, MICHIGAN DEPARTMENT OFTRANSPORTATION (FEDERAL & STATE GOVERNMENT-STATE): It is possible that you might have many centers at other places, which would feed into, like the spokes of a wheel, the major areas, like the MITS center, for example. There could be one at the Metro airport, and another one another place, and so on. And they would be like satellite centers to feed into and connect.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): For adaptive control, though, all you need is a PC and the communication linkage between the PC and the field hardware. It can be a desk, in a corner somewhere, and that's your control center. I mean it doesn't have to be anything as...

RUSS GRONEVELT, WAYNE COUNTY DEPARTMENT OF PUBLIC SERVICES (INTEREST GROUPS-ENVIRONMENT): It doesn't have to be manned.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): Well, no. That's somewhat true, too. You'd like to be able to at least come in and have a printout of all the faults that occurred overnight, or you want to be able to at least monitor on occasion, because most of these systems that are available now are pretty much run autonomously without manual intervention, but when necessary, it's available to provide diagnostics and to correct system failures, and things like that.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Do you have a sense of how much this would cost? I know that you just completed the FAST-TRAC implementation.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): The biggest costs . . . there are two elements of the costs, that are really the biggest portion of it. And that is 1) the communications infrastructure to make it happen, and that's not just installation, but ongoing costs. I would hope that at this forum we could talk a little bit about that at this point, and 2) the actual surveillance infrastructure, the sensor equipment.

For instance, for SCATS you need a specific type of information that you can only get through very specific detection. Otherwise, what'd we have to do, is for instance have a sensor per lane. Instead, what we can do is with our video detection system, we can provide detection in all lanes with one sensor, but otherwise, we'd have to do like the Japanese do, with the infrared or microwave, where they have to basically cantilever out over the road, and provide a sensor looking down into each lane to provide the type of information that is necessary for adaptive control, or loops, which are the same thing, except they are in the pavement.

The technologies aren't cheap. Loops have been cheap historically, or relatively inexpensive vs. others, but then again with our pavement conditions in Michigan, they are very difficult to maintain. Right now, we have in Oakland County 4000 detection areas that are in place right now, with our video system alone, and if we had loops in there in place of that, only about half of them would be operating right now, and secondly it would cost us an arm and a leg just to maintain it. We'd have to add people to go out and maintain that loop infrastructure. You have to look at the operational costs, life cycle costs in addition to the up-front installation costs, and that has to be incorporated in this model somehow too.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): So is it $100 million you are talking about, or... ?

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): To outfit the major arterials in the Metropolitan area, probably around that. If you want to do all of them. Minor arterials like for we're doing that in Oakland, we're looking at $100 million for basically all of the signals in Oakland County alone. All of the signals. You wouldn't have to do all of them to have a pretty good system in place Metropolitan area-wide.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Where would the money come from?

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): It's public money we're looking at because with the exception of possibly some private financing from communications companies, and the other possibility is in the equipment providers, and that, I think, is that we have to go out for a competitive bid, that there is very little opportunity for partnership there. So what we're looking at is really just private contributions in the communications area.

OSCAR VILLALVAZO, JR., ROCKWELL INTERNATIONAL (RESEARCHER-AEROSPACE): But you went through that one fairly quick. One of the reasons that we're here in terms of Model Deployment is maybe we need to, under specific conditions, reexamine that policy.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): Of the equipment providers?

OSCAR VILLALVAZO, JR., ROCKWELL **INTERNATIONAL (RESEARCHER-**AEROSPACE): There are rules and regulations and the whole nine yards, but if this thing is a Model Deployment, the question is: How can really deploy this technology fairly quick? The jurisdictional issues are a big one; maybe this is a policy decision that needs to be evaluated.

RUSS GRONEVELT, WAYNE COUNTY DEPARTMENT OF PUBLIC SERVICES **(INTEREST GROUPS-ENVIRONMENT):** Well, you are talking about a basic policy, it's almost law. It's like an amendment that all equipment must go out for bids.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): It is law. We're required whenever we procure equipment that we have to bid it.

JAY ASEL, AMERITECH (TELECOMMUNICATIONS/ELECTRONICS-COMMUNICATIONS): Let me ask you a question about bidding. In your bid process, do you always go with the low price, or do you always look at the total value picture that you get for what you are buying.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): We're moving more toward that. We're looking more at life cycle now, rather than price. And also extended warranties, and incorporating that into the bid process. Kunwar may be able to talk more about that. We've been looking at design, build, operate maintain types of contracts now, which goes beyond the standard process of bidding and procuring equipment. And that's gonna be more and more necessary in the future, because right now it is very necessary because of the uncer-

tainty involved in all this. Just to give you an example. A real quick one, hopefully. The uncertainly with our video image processing system, and the reliability of the information we're receiving. For instance, in Oakland County, with our current system, many of the local units of government are uncertain about the technology to begin with, and once we ask them to come up with some money for it. They are saying, well first of all, I'm not sure about the reliability of the data we're getting, and secondly, we have no history in terms of what this stuff is, how long it's gonna last, and it's very expensive to replace. We need some sort of guarantee from you that **1) it's** gonna work; and, 2) you are going to be there ten years from now when this stuff breaks down to help us somehow replace it, or that it will even last ten years.

JAY ASEL, AMERITECH (TELECOMMUNICATIONS/ELECTRONICS-COMMUNICATIONS): The reasons why I brought that up to you is that we do more and more partnerships everyday as we're heading down the road. From Ameritech's standpoint, it is a must for us now to partner with somebody, for it to be mutually beneficial for both parties.

BRENT BAIR, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-COUNTY): I've got his card, Jim.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): Oh, you do, okay.

TOM WISSING, EATON CORPORATION (TELECOMMUNICATIONS/ELECTRONICS-AUTO SUPPLIERS): That's the point I was trying to make to you. It's one thing to say I'm buying school buses, computers, and all that stuff. But when it comes to the infrastructure, the major communication backbone to this thing, you can't treat it in the traditional way.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): Correct.

TOM WISSING, EATON CORPORATION (TELECOMMUNICATIONS/ELECTRONICS-**AUTO SUPPLIERS): And that was my point.** Maybe we need to examine some of those policies, and in pieces of ITS, you make exception to the law. Just like you're gonna go off and do the jurisdiction, because if you don't do it, then the guys like Ameritech, MCI, and guys with the fiber. They are gonna sit there and say: I want to be able to provide it to you, but if you are not willing to go into partnership, why should I be there? We're sitting there trying to figure out how the heck to get communications to the thing. I believe we need to look at that kind of hard.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): In terms of that. That's a service, possibly, and we can look at that from a different light. Equipment and services are treated separately in our procurement processes, and again, as I mentioned to Ameritech, not you necessarily, but other Ameritech representatives all along, that's what gonna break our backs, ultimately in this whole conversation, and put us out of business, and we've got funding right now,

infrastructure that we could probably divert to building our own network; we can go into competition with you guys, we don't want to do that. We don't think it's good business for you or for us. Let's talk.

Pre-TripTraveler Information. This is from the public side again. And this includes multi-modal information services. Not just for congestion, but also for providing information on public transit services. Again, what we felt that there was a great deal that was missing in the Strawman, especially in terms of the various types of surveillance equipment that could be used. For instance, pavement sensors for weather information, and surface condition information. We feel that is very important, important for pre-trip travel.

Manual inputs. From road agencies, and from utility companies on where they are working at the time. Where there might be some bottlenecks. Those sorts of things have to be added in there. They are not necessarily automated at this time, at least. But in the next few years we're gonna have to find a way to get that data in there.

Private-Private Partnerships in this case. There might be a communications provider, or a MetroTraffic Control dealing with a radio station, for providing pre-trip traveler information. The public sector doesn't even need to be involved in that one at all. Could be, but doesn't need to be.

To wrap it up, we've got a whole bunch of different types of media that we could provide this information over, and we've nailed a bunch of them, but don't forget the commercial TV and radio, that's always got the biggest audience, and I think it will continue to have the biggest audience in the future, and let's utilize that, not just cableTV and other things.

And we think everybody is gonna pay for this stuff. That's why we've got in here the whole ball of wax in terms of who is paying for what. I think we got a little mixed up in that because we're talking about the public side, but I think we mixed the private and public in together here, and I don't know if we made that distinction necessarily, so we may have made a mistake there,

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Do you feel like you'll have sufficient surveillance information over the whole area within ten years?

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): On limited access roads, yes. And on the major arterial roads throughout the region, yes. And those are the ones that are most heavily utilized. Again, that's got to be our focus, Kunwar.

In addition, we still have our arterial road network in Oakland County, Wayne County, Macomb County, which is the core of the Metropolitan area, and maybe even over into Windsor, and the bridges and the tunnel, but for the most part we need to cover the major arterials, especially in those counties where currently there isn't this capability, and those roads are heavily utilized. 60,000 vehicles a day on a road is a lot of use. So those are the roads we'd focus on initially.

KUNWAR RAJENDRA, MICHIGAN DEPARTMENT OF TRANSPORTATION (FEDERAL & STATE GOVERNMENT-STATE): I agree with you in the statement you have made just now, that we'd like to see that done. Whether we'll be able to do that or not, I don't know. How much we will be able to do. But I agree with you, that part, that we'd like to get that done.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): Kunwar, you put up the match, and I'll give you the FAST-TRAC money right now to instrument State roads in Oakland County.

KUNWAR RAJENDRA, MICHIGAN DEPARTMENT OFTRANSPORTATION (FEDERAL & STATE GOVERNMENT-STATE): Well, Okay. Yes, I agree. That, I will do. But I am talking about the region.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): These are regionally significant roads.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): We should probably hear from the Consumers now.

PAUL LESCOE, US ARMY TANK/AUTO COMMAND (CONSUMER-COMMERCIAL VEHICLES): The private, commercial, and government procurement consumers had an emphasis to getting to our destination when we expected to get there. We wanted to know, and wanted the system to be consistent. We wanted Safety, Security, and we wanted Intermodal Travel.

All of the technoiogies or all of the concepts we selected were technologies that were on-board the vehicle. Information came to the operator while he was in the vehicle system. The infrastructure is so dynamic and changes so quickly that the information you get before you get into your vehicle may not be current by the time you actually get there.

Since we had a selection of three, our emphasis was put on that. To limit our selection even further, we had to take the commercial vehicle electronic clearance, just because we represented the commercial vehicle operators, and we had the international border crossing in the Southeast Michigan area. This is an area that consumes a great deal of our commercial operators time, getting across that. So we had to take them into account in this area.

Another theme is that we were in complete agreement that all of these technologies had to be deployed entirely throughout the Southeast region in order to be effective. **If** they weren't completely deployed, their relevance to the consumer would be drastically reduced. But since they can't necessarily be deployed overnight, the mechanism to deploy it should be that they should try to start in the center portion, Livonia/Farmington kind of area, of the Southeast Michigan area, and expand out like spokes to engulf the Southeast region. And even in the commercial vehicle, you might ask why do you want to incorporate the whole Southeast Michigan, but what you want to do mitigate the time that they need to be reviewed, and the best way to do that, since NAFTA and these kinds of things come to play, where they don't necessarily have to categorize the things for trade purposes, you might want to, at your factory location, alert through some kind of broadcast mechanism, to customs that you are going to be arriving in so many hours to the border crossing and this is the kind of freight that you'll be carrying, so that you can have a very easy time crossing that area.

As Oscar showed, the technology infrastructure to make those things happen is pretty minimal. In fact, the key component, that needs to be overcome is the private/public partnership. In this case with government, so that the mechanism can be agreed upon by the customs people and by private industry.

Going backwards, with number eight, the route guidance and navigation system. Again it was for the entire area. There was a lot of correlation between what was in the Strawman poll, and what was selected by our group. One key thing is that we wanted the navigation system to work with the aviation community, so that in case we were going to the airport, we wanted to be able to know that, to be able to interface with it.

In this one, in the en-route driver information, we selected the PDA devices as a way to get the yellow page information that was one of the requirements in the handout.

BOB ERVIN, UNIVERSITY OF MICHIGAN (FACILITATOR): Is this beacon-based? What's that beacon circle down there?

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): I can respond to that. I put that in the Strawman. What I had in mind was occasional corrections in certain areas, rather than general provision of beacons, and reliance on beacons.

CHIP WHITE, UNIVERSITY OF MICHIGAN (RESEARCHER-UNIVERSITIES): So there could be multi-technologies.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Yes, that was the idea. I've been using the autonomous system, it'd be nice to be corrected occasionally.

BOB ERVIN, UNIVERSITY OF MICHIGAN (FACILITATOR): But is this thing in there? Because he's got surveillance. He's got a whole string of surveillance there, so it must be dynamic. And there must be a data transmission with the vehicle, in order to enable the dynamic part.

PAUL LESCOE, US ARMY TANK/AUTO COMMAND (CONSUMER-COMMERCIAL VEHICLES): In this, and in the en-route, we did address a lot of surveillance technologies, and again, we did have an emphasis on safety and security, so yes it would be dynamic. Anything else we should say about this?

MAC LISTER, SMART (CONSUMER-PRIVATE TRAVELER): The other significant thing about this, and I asked Steve about this in the Strawman. I thought it was kind of interesting. Under traveler information, that there was some kind of route guidance information that people might want to get, but not necessarily from their vehicle. And Steve, in the Strawman, had circled, as opposed to cable TV, and I was interested in that, and the explanation that Steve gave me, you can eliminate it if I don't do it properly, Steve, is the feeling that the was really going to become the medium for your entertainment center at home. That your television set and all of that would be hooked up. That your computer would be your television set over the next five to ten years because initially I wanted to choose cableTV. I accepted that explanation, and I think that may be right on.

JOSEPH SAUL, INFORMATION TECHNOLOGY DIVISION, UNIVERSITY OF MICHIGAN (INTEREST GROUPS-CIVIL LIBERTIES): I would like to comment, even in this area, and I don't have specific knowledge of the plans of the cable providers, but I've heard rumors that may or not be true, that within the next five to ten years, that distinc-

tion is going to become irrelevant. The cable companies would like to provide access, the Telecos would like to provide content programming over the lines, and I think we wouldn't be having this conversation in five years, simply because it would be obvious that it was the same thing.

PAUL LESCOE, US ARMY TANK/AUTO COMMAND (CONSUMER-COMMERCIAL VEHICLES): Okay. Our final category was en-route driver information. This is information intended to enable the driver to make route choices and decisions, changeable message signs, video camera, real-time guidance updates. We saw these as all very important things. As I said, the PDA to get yellow page information, and the ceil phone as an existing infrastructure piece, predominantly the easiest and lowest cost means to work with the system.

KUNWAR RAJENDRA, MICHIGAN DEPARTMENT OF TRANSPORTATION (FEDERAL & STATE GOVERNMENT-STATE): Ail of this in the public domain?

PAUL LESCOE, US ARMY TANK/AUTO COMMAND (CONSUMER-COMMERCIAL VEHICLES): This is public, that's correct, Kunwar.

KUNWAR RAJENDRA, MICHIGAN DEPARTMENT OF TRANSPORTATION (FEDERAL & STATE GOVERNMENT-STATE): Method of payment?

PAUL LESCOE, US ARMY TANK/AUTO COMMAND (CONSUMER-COMMERCIAL VEHICLES): We don't want to pay. I want to make one other comment about the items we did not select. For example, we did not select Mayday for Southeast Michigan, and we're kind of surprised a little bit about how much Mayday has been discussed. It seems like that might be more relevant for [settings] where you are very far away from infrastructure that may be able come out and service your vehicle, and that kind of thing, and that didn't really didn't seem to be an issue with the Southeast Michigan area, and the other thing we're frustrated about as consumers is that we're only now being asked what we want and you guys have spent all this money for the infrastructure.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Paul, I missed the last point, could you link this back to your benefits.

PAUL LESCOE, US ARMY TANK/AUTO COMMAND (CONSUMER-COMMERCIAL VEHICLES): We started with the benefits just saying that the three choices that we made were based on our Safety, Security, and Constant Travel Time, to get to our destination.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Okay, thank you Marty?

MARTIN MONAHAN, FEDERAL HIGHWAY ADMINISTRATION (FEDERAL & STATE GOVERNMENT-FEDERAL): We're kind of offended that those consumers don't have any more faith in us than they have. The three that we picked were numbers two, three and nine.

Number two is the En-route Driver Information from the public side. Number three is a Coordinated and Adaptive Signal. Number nine is Emergency Services Management. I'll show how we felt that correlated with our goals at the conclusion here.

Probably one of the most important ones that we selected was the en-route driver information. I guess the thing that we found different when we got all done, was that we really didn't approach it from a real fiscally restrained perspective, as we picked our devices and our user services. All of these, or many of these, I think we would view to be less than 100% deployed. But we did feel that they had at least a reasonable penetration or reasonable role to play in providing the user service. And when we compared our listing here against the Strawman, we found that he was probably much more fiscally restrained; he was much more conservative than the ones we picked. We've put check marks in there, and we have a lot more check marks, a lot more devices that we thought played a reasonable role there.

When it comes to en-route driver information, we really felt that we could accomplish that in the seven county areas, because we do view a lot of that to be area-wide broadcasts with the radios, ceil phones, and things that area very common, and with the penetration coming along of maybe some in-vehicle route guidance, and some of these other things. We don't look for real big penetrations of that, but we think we'd want to provide for them.

With surveillance, we went for a little broader array. We do feel probes, of course we have probes operating in Oakland County now. So you have that choice of one county, or one significant part of a county. Let me just quickly look at the others, here.

The coordinated and adaptive signals. We figure that taxes were a big portion of that; I don't know, Steve, that's one thing the Strawman wouldn't have. There are some associations that are pretty obvious here. We want preemption, we felt that served our third one we picked as far as emergency service management. And when it comes to communications, we added fiber as a significant communications medium that we wanted to work with.

When it comes to coordinated and adaptive signal control, we took our shot at where we thought that would be deployed. And this certainly needs more work, and you'll see some areas, it's not 100%, it's 30% or 40% or whatever.

It is, though, in full recognition of MDOT who is very sensitive to the local concerns over here that the major trunklines be adequately treated. It was after some of that concern was expressed that we added that footnote there, but they do plan to focus on those high-type arterial5

JAY ASEL, AMERITECH (TELECOMMUNICATIONS/ELECTRONICS-COMMUNICATIONS): Can I ask a question? Why do you have fiber up there?

MARTIN MONAHAN, FEDERAL HIGHWAY ADMINISTRATION (FEDERAL & STATE GOVERNMENT-FEDERAL): Oh, we've got coordinated and adaptive signals. One of the main mechanisms for coordinating them is fiber optics.

JAY ASEL, AMERITECH (TELECOMMUNICATIONS/ELECTRONICS-COMMUNICATIONS): Is it because of the electronics that are put at either end of it, is that because of the band width that is required or why?

MEL RODE, SIEMENS AUTOMOTIVE (TELECOMMUNICATIONS/ELECTRONICS-SERVICE SUPPLIERS): The medium can connect from one point to the other, right?

MARTIN MONAHAN, FEDERAL HIGHWAY ADMINISTRATION (FEDERAL & STATE GOVERNMENT-FEDERAL): Yeah. And to get that information back to traffic management centers.

JAY ASEL, AMERITECH (TELECOMMUNICATIONS/ELECTRONiCS-COMMUNlCATIONS): Yes, I understand, but is it because of the band width that is it required?

MARTIN MONAHAN, FEDERAL HIGHWAY ADMINISTRATION (FEDERAL & STATE GOVERNMENT-FEDERAL): No, adaptive signal controls don't generally require that.

JOSEPH SAUL, INFORMATION TECHNOLOGY DIVISION, UNIVERSITY OF MICHIGAN (INTEREST GROUPS-CIVIL LIBERTIES): Yes, he's asking why fiber instead of simple cable.

BOB ERVIN, UNIVERSITY OF MICHIGAN (FACILITATOR): Or the phone line.

MARTIN MONAHAN, FEDERAL HIGHWAY ADMINISTRATION (FEDERAL & STATE GOVERNMENT-FEDERAL): Well, I guess there wasn't anything in there for wire. Right now, there is nothing in there that represents ground based in wire, and I guess we could've been co-ax, could've been hardwire.

JAY ASEL, AMERITECH (TELECOMMUNICATIONS/ELECTRONICS-COMMUNlCATIONS): Okay, that's all I needed.

MARTIN MONAHAN, FEDERAL HIGHWAY ADMINISTRATION (FEDERAL & STATE GOVERNMENT-FEDERAL): It's probably more a hard connection than it is anything else.

Emergency services management. Again, we felt we had to adapt our chart a little bit to where these devices would be on the total vehicle fleet in Southeast Michigan, but fleet of probably the police and the emergency medical services. We felt they might working with these. We, again, felt that our revenue stream, the public dollar was a big part of it. When it comes to the traveler, we added cell phones in that block of ways of dealing with them and making them a part of the process. When it comes to the institutions, the inter-jurisdictional block here was kind of a key one. And a sharing of local/county police, State police, other agencies of that nature, we, in our analysis, could draw an association between our efficiency that came about relative to that, with the presence of say, signal preemption, the presence of changeable message signs, the presence of adaptive control or whatever.

We could see relationships between that and some of our others. But again, it is not a 100% deal, but it is looked at the idea that we would be addressing the full 7-county area of Metro Detroit. That is the way the State Police, who have a district here, so that their programs, in large part, deal with it, as a seven-county region. This was where we had weighted in previously with our benefits, and we do feel that the user services that we picked, and the approach that we took, probably really is focused on the top 50% of the places where we as the public agencies, first thing this morning said we wanted to focus on. And we can see some association, we certainly support some of these others, here, but we're providing the bulk of our attention on our top three. In our opinion this matches up with 50% of our allocation of benefits.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Let's move on to the Auto Makers now.

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B): Okay. You remember this fantastic chart from this morning. Part of our strategy as the automotive industry was to examine our earlier objectives and the needs to be profitable, and to try to minimize the number of investment for the maximum amount of return, and so we looked at our pie chart of this morning, and decided on three areas to focus, which would gain not only the manufacturers, but also our customers the most benefit.

Those three areas are in-vehicle signing and in-time hazard warning. Commercial vehicle electronic clearance, and en-route driver information, private or public. The main underlying rationale is to improve the connectivity between the vehicle that is driving on the roadways, and the infrastructure or roadside devices, or resources.

So if you find improved connectivity, you'll find that where I've placed the orange dots here, ail of those areas, can be service. Whether it be Mayday, or whether it be stolen vehicle recovery, driving aids, route guidance, yellow pages, etc. all the way into CVO, just-in-time delivery, vehicle transport, and assuming that this improves the efficiency of the driving scenario, that people go directly to where they want to go, to their destinations. It should also have impacts on improving fuel economy, because they are not held up as much as they might be in traffic, if they knew how to get around it. It would also have an overall reduction in overall emissions, and ail that good stuff that comes out of our tailpipes when we're stopped, waiting for the car in front. So that's some of the background, simplified, I might add.

Let's go on to the first. These are in order of the priority that we felt for deployment. Not necessarily to the auto industry totally, but kind of an overall priority, based on what it could benefit the public the soonest, as well as give us some return on our investment. First of all, we decided that this should be a regional deployment. That's the easy decision. Next is that we focused on what type of connectivity might be the best, and decided that a microwave system would serve both our industry as well as the long-term infrastructure the best because we could design and develop one device, operating on one frequency. By the way, we are kind of suggesting maybe 5.8 GHz, and probably that's more focused than you'll want to get here, but some kind of a frequency. This happens to be a European standard, or near standard, it's also been talked about in the US industry. What better way to optimize costs than to build one system, one device that might be good ail over the North America as well as other places in the world.

So we thought we'll establish a connectivity panel or channel link, and that's for not only this service, but also for all others.

Inside the vehicle, we know that having only the receiver would be a minimum requirement to provide in-vehicle signing and hazard warning. However, there can be a significant level of increased efficiency with the use of a transceiver. So we're really recommending a two-way device, at a slight additional cost. We're gonna need some sort of a display in the vehicle. For what wasn't provided for, we're going to need an audio

augmentation to the visual warning. As we were sitting here listening to the other talks, it suddenly occurred to me that if this goes the way of the cellular phones, it may in fact evolve to some kind of a PDA or pocket-sized device that while you are in the car and driving you can get some kind of in-vehicle signing and hazard warning, plus you might be able to take it with you and it might be used as a pager or some other type of communications device. Again, the idea is to make the best use of the investment and connectivity.

BOB ERVIN, UNIVERSITY OF MICHIGAN **(FACILITATOR):** Ivy, you mentioned region-wide. At what level would it be deployed?

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B): The beacons are deployed on the arterial streets throughout the network to give you route-specific hazard warning. If you are driving near the airport, you don't really care what happens in Jim Barbaresso's backyard, you are more concerned about what is going on I-94 and I-275.

So the hazard warning element and in-vehicle signing would be from beacons deployed at the roadside, giving specific information to the travelers on where the hazards and problems are, be it roads, congested incident or whatever.

And that probably is a good lead-in into the sensors that are needed to monitor the roadways to better define the hazards and perhaps automate that function. Flipping it around the other way, if this is a two-way system as we recommend, then the system could actually provide a means of vehicle probe information. There are so many cars at the airport requesting hazard information; you maybe know where there may be a larger pool of cars or more congestion than anywhere else in the system.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): Where is the information coming from?

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B): The information is coming from two places. It is coming from the infrastructure, but primarily it is coming from a private source, like a TMC, for example. Or you could hire that out, you could farm that out to a private company to provide.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL **GOVERNMENT-REGIONAL):** So you had nothing in the center column?

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B): That's right. We really weren't concerned about deploying the center part of it. We figured the information you'd provide.

BOB ERVIN, UNIVERSITY OF MICHIGAN (FACILITATOR): You guys are gonna supply the beacons, Ivy?

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B): Probably not us as the industry, but a company like Rockwell can make the beacons and the in-vehicle system and supply it to both of us. If there is a standard, certainly we could make the in-vehicle part and Rockwell, or TRW, or whoever else wants to be in the business can make the beacon side of it. The idea is that by

having the one frequency or one standard of communication, you have the benefit of high volumes. $10 millions instead of hundreds or thousands, and that leads to integration of electronics, cost optimization.

Look at your cellular telephone. It wasn't long ago that that it was measured in thousands of dollars, and now you can go out and get a free one for a one-year contract.

BOB ERVIN, UNIVERSITY OF MICHIGAN (FACILITATOR): Do you have any sense of what the in-vehicle costs would be?

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B): Not really. But if I was to take a guess, then it would probably be $100, and then by the time features are added, about $400-$500, comparable to today's radio costs. Again, it depends on who makes how many chips for how much money.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): Do you envision also other functions for those beacons?

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B): I'll get to that. Hang in there. This is only in-vehicle signing. A single communications channel for all services.

ED GREENE, FORD MOTOR COMPANY (AUTO MAKER-COMPANY C): You ask where the information comes from. The simplest form is that you just have something that is an electronic milepost. It's the static information that says that you are on l-75 at milepost such-and-such. And the following exit is three miles up the road, and it is such-and-such, so it's just static information that somebody will program into a chip and it will be sitting there beside the road. In which case there is no center involved, just whoever programmed the chip and set it out there.

The same thing, once you have that, and it is in on the cards, where you can display information, you can then have advertisements. Right now they display the next exit has a McDonald's or so forth and it has these gas stations. All of these types of things can be done electronically so that it is displayed in your car.

And you can have electronic speed limits posted, so the person knows what the speed limit is when he's in his car. All of these things can just be static.

CHIP WHITE, UNIVERSITY OF MICHIGAN (RESEARCHER-UNIVERSITIES): Would you think beyond a regional deployment for that kind of a plan.

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B): Yes. Nationwide, in fact. The more, the merrier once you have the recipe developed. Of course you have to be careful about commercialism. I can just see the next incident brought to you by Indianapolis Life Insurance or something like that.

To answer the comment or concern that Jim made about not having anything in the center area. We really didn't focus on that. We thought that some of the sources of information for in-vehicle signing could be from existing video cameras, or loop detectors, call-ins, and the kind of measures that we use today. I think even ten years from now there will continue to be ways of getting the information in. Even though only one third of the loop detectors will be operational.

ED GREENE, FORD MOTOR COMPANY (AUTO MAKER-COMPANY C): Can I make a comment about beacons and so forth? If you did something like mileposts on the interstates, there are 50,000 miles of interstate. If it costs $1,000 per mile to do mileposts, then that is still only $50 million. The government [spent] a little more than that on FAST-TRAC.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Oh wait a minute. And you are a partner, even.

ED, GREENE, FORD MOTOR COMPANY (AUTO MAKER-COMPANY C): And a lot more on Advance.

OSCAR VILLALVAZO, JR., ROCKWELL INTERNATIONAL (RESEARCHER-AEROSPACE): Jim's been taking some arrows here.

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B): Let's go on to CVO, which is another area, that uses the same, or is based upon the same communications technology and connectivity that we talked about on the first slide. But this addresses more of the CVO interests of electronic clearance, electronic payment, validation, or whatever else is in involved. Here, obviously we are talking about a two-way transceiver, and it could be augmented or maybe even incorporate some sort of a tagging system. Again, it will need a display, an audio enunciator of some kind to make the driver aware of coming up to a weight station or a border crossing or whatever the circumstances. This is a way of collecting revenues, at the border crossings, or wherever they are needed for example, between Canada and the US. and vice versa.

Could be initiated or be a public or private type of enterprise that provides this service. Certainly interstate and international. Likewise could be a vehicle probe function, because as trucks or commercial vehicles are cleared, you have a count of how many they are, you certainly know where they are going, what kind of cargoes they are carrying, and if nothing else it could be some kind of demographic database and vehicle frequency, etc.

Inherent in some of this CVO technology is weigh-in-motion. Our recommendation for deployment is that any entry point into this region or area, Southeast area. In fact we drew in the border crossing here between Windsor and Detroit as other border crossings can be included. The bottom line is that it is based on the same microwave connectivity link. Now we're serving two purposes, and hopefully amortizing the cost over a multitude of functions. Finally, is en-route driver information. Public or private. We recommend that it is regional, and the outline scenario is very similar in that the same communications channel is recommended although we recognize that there are broadcasting and there will be cellular links in existence, but those may not be and probably will not [have] an automotive industry endorsement or encouragement if you will. They will exist for other reasons and could also have that type of information.

In the vehicle, a receiver will perform the basic function, but we're really recommending a transceiver or two-way functionality. Again, it could ultimately go from a big box to a hand-held device, that could be more of a personal en-route information system, not just a vehicle based information system.

It could be sponsored by advertisers, gaining some revenue in terms of payment, and justifying this type of system. There could be user fees, there could be subscription fees, and many different ways of paying for this service. It would not have to be a public service in terms of public funding. It gives a great opportunity for independent service providers, so there is another industry helping to foster outside the automotive industry.

Interjurisdictional, certainly. Public or private, or perhaps both. Co-mingling so to speak. The system, also, based on the two-way concept, whenever you inquire for information or you want route guidance will have some element of a probe function. That, I guess, is it. Any questions?

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Now the Interest Groups. We have one more table, and I know that some people are getting up and kind of restless, so we'll take a break. The problem is that the refreshments will not be available until after three o'clock. What I'd suggest is that we will be taking another break after that, and if you want something at about three o'clock you can feel welcome to go out and get something.

JOSEPH SAUL, INFORMATION TECHNOLOGY DIVISION, UNIVERSITY OF MICHIGAN (INTEREST GROUPS-CIVIL LIBERTIES): I'll do my part, and try to keep this fairly brief. To remind you, our perspective is not exactly unified by any stretch of the imagination. So the services that you are going to see reflect the three very different interests within the group. First, the environment. Then the transportation disadvantaged, and civil liberties and privacy advocating.

Unfortunately, I'm definitely the least qualified member of our team to explain this, but it's not that different from previous proposals. I will comment that again, we seem to be hand-in-hand with local government, which is kind of interesting.

This is very similar to the Strawman deployment except that we actually omitted some areas that the Strawman did include because we felt that those were not priority areas to deal with. This of course, is from the environmental section of the interest groups, because among other things, it makes extensive use of existing infrastructure, without requiring new building. From the transportation disadvantaged, we have paratransit operations management. The changes that we made, were first to expand beyond Oakland County. I recognize that there may be political barriers to that, but as a practical matter, it would be good if we could do it. And second, to come up with additional sources of funding through taxes and through subscription, which is a technique which is already used by AATA and I assume other mass transit organizations.

I should preface this by saying that in my interest group the issue isn't so much what services are deployed, as how they are deployed, and how the information that is needed and used in order to coordinate them, is then used and/or made available. So it's not so much a matter of my selecting services as saying please be careful when you deploy whatever services you are going to deploy, that personal information about people is handled in a way that is consistent with interests of privacy and a desire to control that information.

We chose this service because pre-trip traveler information is a pretty non-intrusive sort of thing. The only change that I made from the Strawman deployment was to add the possibility of funding through sponsorship, which is already a very common way of funding sites on the worldwide web, on the Internet, and if any of you have used the Prodigy on-line service, that is common as well. And that's about it.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): I suggest that we take a break now, return in ten or fifteen minutes and we'll try to impose some cost constraints on these choices.

[BREAK]

[5] Perspectives Generate and Present Revised Strawman Deployment Plans]

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): All right, I'd like everyone to take their seat so we can move on to the next stage. I guess this next phase is called getting real. And I noticed that when I was going through the process of installing both the services and the infrastructure, when you think of a ten-year time frame, you can pretty much accommodate anything, and I noticed also, that each one of the tables had services deployed pretty much everywhere. And that doesn't help us prioritize for the near term.

And the near term can be very near when you are looking at Model Deployment and within a couple of years when you are talking about the Strategic Planning activity. So we need to get real and consider some of the cost constraints. We thought that a useful exercise would be to translate some of these services into the actual infrastructure that would be required, and on this ITS subsystem deployment map, what we have are these symbols that you were placing in the cells, and their location.

Now it's not for ten years down the line, but it's for the present situation including the deployment of the MDOT plan, which should be completed at what time, Kunwar?

KUNWAR RAJENDRA, MICHIGAN DEPARTMENT OF TRANSPORTATION (FEDERAL & STATE GOVERNMENT-STATE): The Strategic Plan, or the Deployment? The Deployment should be completed in Summer 1997.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): What I'd like to do, while some of you take a look at this, is explain some of this. We were looking at the services, and then how we can provide these services through the subsystem. This map, we're looking at the subsystems, which are the larger colored area, including sensors, roadside communications, surveillance, traffic control vehicles, payment, traveler, etc. We're interested, at this point, in the geographical deployment of the infrastructure component of that. And the infrastructure being roadside communication, surveillance, and traffic control, and centers. So it's this side of the map that we're interested in that this point in time, and as it relates to the services that you want to have provided, which are on the outside rings.

So we're looking at blue, purple, red, and orange, and what we have here in the central map area is where the infrastructure is currently deployed, and the question is: Given certain cost constraints, what should

be the incremental deployment at this stage? For this, I want to turn it over to Bob Ervin, who has done some back-of-the-envelope calculations on costs, and he'll lead us in this discussion.

[The diagrams for deployment unit cost estimates are *given in Appendix 1 of the ITS Deployment Exercise Summary Report.]*

BOB ERVIN, UNIVERSITY OF MICHIGAN (FACILITATOR): Well, we thought we would pose a specific question, imagining this model deployment ball game, where we expect a solicitation to appear in the next couple of weeks from the government, and the number we want to use is: imagine that we might be appealing for $10 million dollars of Federal money, and finding some kind of match on various soft sides, perhaps, but the $10 million would likely go largely into new infrastructure, so it's like saying, this is what we have today. It's largely summarized by freeway coverage of surveillance and certain control functions in much of Oakland County's arterial streets. That's a pretty good summary of what we've got. And the question would be: Given the different kinds of interests that exist around the different tables, and the different things that you'd like to pull off, if you had the opportunity to do it, what would be the best way spend this $10 million dollars of new Federal money, which we have to somehow match up with some other money? So then, that begs the question: Well, gee, what does any of this stuff cost on a per unit basis anyway? And of course, I don't really know, but I have taken a shot at putting costs on and I've taken a shot of putting costs onto the primary infrastructure kinds of elements.

I have tried to, as Dick used the term last night, calibrate these numbers by running a community-wide total and I'll show that to you in a minute, and I know that some of you folks are really into some of these issues, and you really know the answers and so we can maybe take a couple of minutes and get a better estimate than what I gave. But here I have two kinds of numbers: A unit cost for the costs at the center for supporting coordinated signals on a per area basis, and an area is a block of land, like the Sterling Heights, the Troy area, the Rochester area, the Orchard Lake Area. We've said that each of them is about the same size, and I think the size is on the order ten miles by ten miles, or maybe it's six miles by six miles, but it's of that order. That's about how big these pieces of land are, that I've called an area. I am distinguishing the term area from the term "link", and a link is a hunk of freeway and they are all marked on here. There is East l-94, Northeastern l-94, West l-696. That's a link. It's essentially a freeway link. Now much of the freeway link stuff will have been accomplished by much of the investment that is going on with [Michigan] DOT right now. So as a way of costing, there are center-like costs, there are some communication costs for which we have here roadside-to-vehicle communications. That would include the beacon kind of stuff that you guys are talking about, surveillance costs, of which I've got probe vehicle, loops, aerial, and video. We recognize that loops and video can be traded off as a hardwired, along-the-road coverage kind of mechanism, and then the traffic control related installation. Signal preemption provision, WIM, changeable message signs, and then the adaptive control elements that would be deployed on kind of a arterial-street-area basis, so I got these kinds of numbers. I've tried to list them the way I think it's normally

thought of. Namely, these are kind of area type coverage provisions. Compiling messages for presentation to road users in an area, $200 thousand per area (about 100 square mile piece of land, probably).

HAR, $1 million per freeway link. This sort of stuff gets its cost, my understanding is, not from buying the hardware, but from digging that stupid trench, and laying all that conduit, and so it's like $100 thousand per mile or something like that. But you guys can tell me. And it may be that we would consider HAR not simply as a roadside freeway installation, but as an area thing, and in every case an area means, going to the arterial streets. That's what I mean by an area. I think that's what we mean every time we show one of these. Essentially the way we're practicing it in Oakland County right now, we're seeing an area is off-freeway addressing the arterial streets, and then serving the road users and so forth that occupy that portion of the network.

So these are my numbers and let me just show you how I validated it, just so you get a sense of the total scale of a community-wide full-up installation. I just rattled them out. I took the number of links on here and multiplied by the unit costs, and took the number of areas, and multiplied by the units. The center costs looked like $24 million worth; roadside communications, if it was only on the freeways, looks like it'd be about $36 million, if we really meant areas, which is phenomenal, if you imagine roadside communication along all the arterials, it comes out to about $280 million dollars. Surveillance, I get this on the freeways, and this on the areas, the areas are really big. If we considered probes as an alternative, and I don't know if any of you noticed my probe number, there could be a lot of debate on something like this. $5 million per area for probe performance, and here the only number I had to go on was when we costed out the cellular phone location scheme a couple of years ago, it looked like the hardware that would have to be installed at every cell site was of the order of like $50 to $100 thousand dollars, and so for the community that's about the number that would correspond to that.

So if you really believed in probes, if you believe that they might come by a technology like that, we frankly don't know if we have today, it would be like $70 million for the whole community. You might say, in contrast, to this hardwire coverage, and then traffic control-related features meaning adaptive signal controls, which is a much bigger number here, and the freeways. I total it up and get a half a billion. I think that's of the scope of the kind of numbers I've heard of the kind of community the size of Metro Detroit. So that's sort of what I mean by calibration. Yeah, I think it's in the half a billion or so range, that others have said a community the size of Metro Detroit might require for its ITS infrastructure.

So now, depending on what you want to do, Steve, we can kibbutz these numbers so that in a little bit, just to tell you how to understand the sequence is supposed to work. When we kind of agree on some numbers that are useful for the discussion, then I think Steve's gonna ask each of you to go back into your group and say Okay, now if this is what it costs, then how do you guys feels the community should spend $10 million new dollars to do the stuff that would matter, and would build off of what we have, and give us a chance to make some meaningful further progress. Is that fair, Steve?

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Yes, that's fair. You have some questions?

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): I see up there the hardware and the roadside-vehicle communications, but what I don't see is the communications infrastructure that is necessary to support the field hardware and everything, unless it is buried in those numbers.

BOB ERVIN, UNIVERSITY OF MICHIGAN (FACILITATOR): Well, like the adaptive signal controller. Four million dollars per area. Does that seem just like the hardware at the intersections, and no wire in between?

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): That's what I was wondering.

BOB ERVIN, UNIVERSITY OF MICHIGAN (FACILITATOR): I had intended that it was the cost to implement adaptive signal controllers on the ground, and this is the cost to adapt, to implement adaptive signal controllers at the center.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): Okay. So the infrastructure is buried in there.

BOB ERVIN, UNIVERSITY OF MICHIGAN (FACILITATOR): Yeah. That's the idea. But if it's not the right number, then let's diddle it a bit and make a better number. Tom?

TOM WISSING, EATON CORPORATION (TELECOMMUNICATIONS/ELECTRONICS-AUTO SUPPLIERS): This is just for the initial cost, right? This is not the recurring cost of these activities. There is no labor in this.

BOB ERVIN, UNIVERSITY OF MICHIGAN (FACILITATOR): Yeah. That's right. There is labor, it's mostly labor. But not continuing kinds of costs.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): But there is labor, but no ongoing operating maintenance costs.

TOM WISSING, EATON CORPORATION (TELECOMMUNICATIONS/ELECTRONICS-AUTO SUPPLIERS): There's no operating.

BOB ERVIN, UNIVERSITY OF MICHIGAN (FACILITATOR): 0 & M as they say in the business.

CHIP WHITE, UNIVERSITY OF MICHIGAN (RESEARCHER-UNIVERSITIES): Is that a cost per annum?

BOB ERVIN, UNIVERSITY OF MICHIGAN (FACILITATOR): No, my understanding is that it's a capital cost implementation. It's just a number that I know has been associated with the cellular phone cell-side augmentation to multilateral on vehicles with phones radiating.

CHIP WHITE, UNIVERSITY OF MICHIGAN (RESEARCHER-UNIVERSITIES): Although, I haven't been able to find anybody, who has been able to verify the number that was in the RFI, that number was $310 million.

BOB ERVIN, UNIVERSITY OF MICHIGAN (FACILITATOR): Which RFI?

CHIP WHITE, UNIVERSITY OF MICHIGAN (RESEARCHER-UNIVERSITIES): This is the Model Deployment RFI.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): For a metropolitan area of 750,000 population. Like Detroit.

BOB ERVIN, UNIVERSITY OF MICHIGAN (FACILITATOR): Well, we're a lot bigger than that.

DONALD ORNE, P. B. FARRADYNE (RESEARCHER-CONSULTANTS): Bob, would you go to your second slide? The thing that jumped out at me was that this area of surveillance was about 60% of the total, and depending on the variance of your estimates, that can really swing the ultimate real toll. And I think that when we get back to our task, there is a serious question about how much area surveillance of the time type that is portrayed here can we really stand.

CHIP WHITE, UNIVERSITY OF MICHIGAN (RESEARCHER-UNIVERSITIES): Yes. And the $70 million with probes covers both freeways and units, is what you are saying right now.

BOB ERVIN, UNIVERSITY OF MICHIGAN (FACILITATOR): Yeah, right. That's the whole community by that scheme. And it's also true that there are synergy's. You guys have done a lot of this installation along freeways. Once you land a trench, and land conduit for surveillance, putting roadside communication along as an incremental cost, is of course, reducing the cost a lot. I don't know what to say about that straight-away. I don't know how we can handle that in this cursory exercise. Isn't it fair, Steve, that we're trying to consider this $10 million bogey, as a way to kind of register together how you see your priorities when you bring them down to a specific call for action in deployment. In terms of enhancing the deployment.

CHIP WHITE, UNIVERSITY OF MICHIGAN **(RESEARCHER-UNIVERSITIES):** Bob, you are talking about a $10 million request from the Federal government. But how about the matching money?

BOB ERVIN, UNIVERSITY OF MICHIGAN (FACILITATOR): Yeah, matching money that may or may not go into infrastructure per se.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): I was wondering if Marty might comment on it, because you were talking about that a little bit yesterday.

MARTIN MONAHAN, FEDERAL HIGHWAY ADMINISTRATION (FEDERAL & STATE GOVERNMENT-FEDERAL): The final number that's available hasn't been put at our feet, but I think the numbers are fairly common knowledge that we think we have something in the order of $20 million for a nationwide solicitation. And **I** think in the RFI, we've mentioned one to three sites that we will be looking at, depending on the strength of the proposal. The idea that it is a 50/50 match, though, is a very important part of this whole scheme of Model Deployment. That proposal is gonna have to come with the idea that match can come from regular Federal aid, it can come from private sector services that are provided and so forth. But it's gonna have to be there.

STEVE UNDERWOOD, UNIVERSITY OF **MICHIGAN (PROJECT DIRECTOR):** So it's somewhere around $12 million to $20 million. With the match and everything, or . . . ?

MARTIN MONAHAN, FEDERAL HIGHWAY ADMINISTRATION (FEDERAL & STATE GOVERNMENT-FEDERAL): No, if you were saying here that you had hoped to acquire $10 million from the Federal initiative, your overall initiative you would cost out at $20 million.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): So $20 million at the top, probably, if there are two selected.

BOB ERVIN, UNIVERSITY OF MICHIGAN (FACILITATOR): That's exactly how I took the numbers. I said if the Feds got a total of $20 and they select from one to three, which means two, and they give them each $10 million, and they require a fifty percent match, then we get $10 million new Federal dollars, which maybe we can put directly into infrastructure, and we go beg and borrow screwy looking money, amounting to another $10 million that may not go directly into infrastructure but may pay for GM engineers, and people out in Oakland county doing something, and blah blah blah.

MARTIN MONAHAN, FEDERAL HIGHWAY ADMINISTRATION (FEDERAL & STATE GOVERNMENT-FEDERAL): It is gonna have to be associated with the Model Deployment issue. It's not off-line, it's not later. It is part of what it's going to take to achieve a model deployment.

BOB **ERVIN, UNIVERSITY OF MICHIGAN (FACILITATOR):** But it might involve vehicles being implemented with complimentary equipment in order to exercise some of the functions that were on your different services.

MARTIN MONAHAN, FEDERAL HIGHWAY ADMINISTRATION (FEDERAL & STATE **GOVERNMENT-FEDERAL):** Right. Now there's one aspect of that Model Deployment RFI that you would call to, is that because of the time frame to get this in place. We're talking about, as you said, getting that RFP in the street, we're talking about having those projected, selected, and negotiated sometime in a period of July of 1996, and we're expecting those projects to turn on, and to be showing the world an integrated model deployment by December of 1997. And so we don't have time to do, or it isn't anticipated that you would be doing much research with probes.

CHIP WHITE, UNIVERSITY OF MICHIGAN (RESEARCHER-UNIVERSITIES): How do we kind of fit together the $20 million dollars we would probably have if we won vs. the $310 million that was mentioned in the RFI?

MORRIE HOEVEL, FEDERAL HIGHWAY ADMINISTRATION, LANSING (CONSUMER-GOVERNMENT PROCUREMENT): The $310 million is a full deployment, and various areas are on various scales of that. But the $310 million really comes from this exercise of looking what we call the core infrastructure. I think you almost need to, or could be thinking in terms of the differences of the core infrastructure points.

STEVE UNDERWOOD, UNIVERSITY OF **MICHIGAN (PROJECT DIRECTOR):** Those are located in a reading in everybody's binder.

MORRIE HOEVEL, FEDERAL HIGHWAY **ADMINISTRATION, LANSING (CONSUMER-**GOVERNMENT PROCUREMENT): They are in the binder here. Here is an overhead of it. In terms of the Core Infrastructure. The concept of both the core infrastructure and

the Model Deployment is one of going out to these communities and finding which of these seven components, which applicable to the area. If you do not have toll-roads in your area then that is an irrelevant issue in the early days. But these are the sorts of things that both the core infrastructure and a Model Deployment are looking at seeing. How much is there? And how much you can glue together and really get humming more efficiently with this influx of 50/50 money. And it will serve you as an individual community, and the real intent of the Federal money going in this case, is that you are going to be a showcase for others across the country that will say: Well, if you really get this stuff clicking, here's what you can achieve.

The $300 million is if you got all of this going in a full-size metropolitan area of 750,000, and you were starting with a clean sheet of paper, and there was no 32 miles in and another 140 under contract. There was no Oakland County new set of signals, there were no changeable message signs, or Traffic Management Center or any of that stuff, so you kind of subtract from that number.

CHIP WHITE, UNIVERSITY OF MICHIGAN (RESEARCHER-UNIVERSITIES): The RFI indicated that an example figure of what would be a typical deployment would be $100 million dollars already in place.

DONALD ORNE, P. B. FARRADYNE (RESEARCHER-CONSULTANTS): That's about what we will have.

CHIP WHITE, UNIVERSITY OF MICHIGAN (RESEARCHER-UNIVERSITIES): Yeah. That's roughly the same number.

KUNWAR RAJENDRA, MICHIGAN DEPARTMENT OF TRANSPORTATION (FEDERAL & STATE GOVERNMENT-STATE): They quoted Detroit as an example.

DONALD ORNE, P. B. FARRADYNE (RESEARCHER-CONSULTANTS): Perhaps I could add a point of clarification myself. The origin of all of this is the ITS America Planning Committee, and we spent a day two months ago and the concept was already there from the JPO, and we identified were four Model Deployments, and 25 Core Infrastructures, and the estimates rolled from that. And that's what was moving forward was the administration's proposal, and then it was whittled back in the appropriations process.

KUNWAR RAJENDRA, MICHIGAN DEPARTMENT OFTRANSPORTATION (FEDERAL & STATE GOVERNMENT-STATE): The 50 percent match required; is that a hard match?

MORRIE HOEVEL, FEDERAL HIGHWAY ADMINISTRATION, LANSING (CONSUMER-GOVERNMENT PROCUREMENT): No. It can in fact be either State dollars, Federal Aid and State matching money, or in-kind services where Metro traffic is working with you, or others are working with you. But it's a battery of activity. Not the idea that they are now doing this or doing that.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): It sounds like we've got really two objectives here for our Strategic Plan, and one is full deployment and where we are going to go ten years from now, and the other is how do we address this Model Deployment RFP in the shorter term. That's a relatively quick time frame. And what is it that the Model Deployment program is really attempting to achieve. And

I thought if we focus on that just right now, and see what that would entail. Obviously, we are talking smaller scale than full deployment, so do we need to focus on a full deployment in a small geographic area, or fill in some gaps and look at a broader geographic area and try to fill in certain major arterials in the network, as an example.

Secondly, I think one of the things that the Feds are trying to achieve by this is the integration and dissemination of the Core Infrastructure elements and the dissemination of the information to the public. Now how do you achieve that in the short term too? I think we've got a good start in terms of the systems we're developing both at MDOT and both our FAST-TRAC Integration efforts to at least lay a foundation for doing those sorts of things. But if we're to focus our attention right now, I think we ought to focus one on: Where do we fill in the gap, or do we concentrate on a specific geographic area? And secondly, then: How do we implement, in the short term, a model traveler information service function, which includes all these various user services that we've been talking about?

MORRIE HOEVEL, FEDERAL HIGHWAY ADMINISTRATION, LANSING (CONSUMER-GOVERNMENT PROCUREMENT): Everything I said I agree with you, and I will emphasize again, that the component that will be most attractive is that which has the traveler information component, where the information is used from freeway management, from transit management, from incident management. It's not only used internally to operate it, but we want to get it out on the radios. We want to get it on the billboards and the PDA's or whatever you've got.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): The next step is to have each of you at your tables caucus and generate a plan on how you would spend this money, however much that may be. Plan on how you might receive match, and where you would receive the match from, and then to go around again to generate ideas rather to focus in on a single idea right now. I noticed, Chip, you had a question or a comment.

CHIP WHITE, UNIVERSITY OF MICHIGAN (RESEARCHER-UNIVERSITIES): It dealt with Jim's first question. I think the RFI discussed a regional deployment as opposed to a specific area.

MORRIE HOEVEL, FEDERAL HIGHWAY ADMINISTRATION, LANSING (CONSUMER-GOVERNMENT PROCUREMENT): Yes. As that RFI talked to it, it is a Metro that comes to you with the best Metro area application of the core infrastructure. And that's the way I think it's still working. I'm not sure, but I think there has been debate of whether to go for smaller areas, and tighter areas, or to approach it, but the RFI talked to what we were trying to accomplish. It spoke to regions a lot.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): But for $10 million, that may be hard to accomplish.

MORRIE HOEVEL, FEDERAL HIGHWAY ADMINISTRATION, LANSING (CONSUMER-GOVERNMENT PROCUREMENT): That's the challenge that those that want to play the game must deal with.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Bob raised the point that some people may not feel comfortable about understanding the current deployment situation. And we have experts on both the FAST-TRAC and MDOT deployment at this time. And we do also have it represented here. Does anyone here need clarification as to what it will be currently in existence, and if so we can elaborate a little bit more on that.

JAY ASEL, AMERITECH (TELECOMMUNICATIONS/ELECTRONICS-COMMUNICATIONS): My question was: Is that the area that we are talking about? Is that what's represented on your charts right here?

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Well, regional might be just a little bit beyond this into Ann Arbor, and also north of this.

BRENT BAIR, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-COUNTY): Let's truly define our budget. Is it $10 million, or is it something higher than that in terms of hardware installation? I suggest that because we can use Federal funds to match that we would probably look to do that. Money available for hardware is more like $17-18 million. There will be some soft match in there, but if we're really looking at what we can afford here. Let's talk $18 million.

OSCAR VILLALVAZO, JR., ROCKWELL INTERNATIONAL (RESEARCHER-AEROSPACE): Whose Federal aid are you gonna get?

BRENT BAIR, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-COUNTY): MDOT's.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): Yesterday at the ITS Michigan Board meeting, Kunwar said no problem when we asked about the match.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): This is the MDOT Deployment Map. And they have an approach and a set of symbols that is pretty similar to ours, and they show where the existing infrastructure is in the black area, and the planned infrastructure for 1997 in the orange areas, and the types of infrastructure that they are planning on deploying include ramp metering, mainline detectors, closed circuit television, changeable message signs, highway advisory radio, and mainline vision detectors. I've reviewed this pretty closely. It looks like they have sparse deployment of most of these capabilities over the entire system with the exception that on I-96 and I-275 here, it is primarily limited to closed circuit television. I'm not really sure what the reason is for that, there is a general deployment of just about everything, except in that particular area. So they got out to the fringe and that's all they could afford.

[The MDOT Deployment Map is available from Kunwar Rajendra of MDOT.]

BOB ERVIN, UNIVERSITY OF MICHIGAN (FACILITATOR): What about Brent's number, $18 million? People satisfied with taking a crack at that as our target budget?

KUNWAR RAJENDRA, MICHIGAN DEPARTMENT OFTRANSPORTATION (FEDERAL & STATE GOVERNMENT-STATE): How did you get to that number, Brent?

BRENT BAIR, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-COUNTY): Well, I figured somewhere there's gonna be some soft match in services that we can't reflect up here out of the private sector, out of use, or whatever, so I discounted by $2 million to allow from that soft match of other things that are going to be done that don't reflect in what we were trying to install.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): It may indeed be more than that. We reported yesterday at the ITS Michigan meeting that we now have $23.5 million dollars of CMAQ money in Southeast Michigan, that we didn't necessarily anticipate a few months back because we achieved attainment here in Southeast Michigan, while the NHS bill that was just passed allowed us to retain our CMAQ money, which would've gone away otherwise. CMAQ has been a major source of the funding right now, that is being used for the freeway instrumentation, and there's a good possibility that a chunk of that could be used for this purpose, and so it could be even more than the $10 million dollars or whatever is necessary to match. Who knows?

KUNWAR RAJENDRA, MICHIGAN DEPARTMENT OF TRANSPORTATION (FEDERAL & STATE GOVERNMENT-STATE): The $23 million is for the whole state, divided between Western Michigan and Southeast Michigan, divided between MDOT and the local . . .

BRENT BAIR, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-COUNTY): It wasn't fair of me to say it was MDOT's money, because it would be local CMAQ.

BOB ERVIN, UNIVERSITY OF MICHIGAN (FACILITATOR): Well, all we need is a number that is a useful working point.

KUNWAR RAJENDRA, MICHIGAN DEPARTMENT OF TRANSPORTATION (FEDERAL & STATE GOVERNMENT-STATE): Considering everything, maybe it will be two proposals, maybe it will be three.

BOB ERVIN, UNIVERSITY OF MICHIGAN (FACILITATOR): Would it be useful just to round it off at $20 million, just for this discussion?

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Yeah, let's do it. Anyone need clarification on what's going on in Oakland County with regard to FAST-TRAC with the AdaptiveTraffic Control System, and Route Guidance System? Okay. In theTroy, Bloomfield Hills, Rochester Hills, Auburn Hills, Pontiac area, there is deployment of an Adaptive Traffic Control System over much of this network, focusing on the major arterials and any kind of problem areas, with extensive initial deployment in the Troy area. Supplementing that, there is the ALI-SCOUT Route Guidance System, which was developed by Siemens, and it's a beacon-based system, and there substantial coverage of beacons in especially theTroy area, but a little bit beyond that too.

Coupled with the Adaptive Traffic Control System, there is an Autoscope Detector System at each one of the entrances to the intersections. There is also a major effort going on to do Information Integration at the Traffic Control Center, so that they are collecting a whole variety of forms of information, traffic related information, and also disseminating that over this region, **and also** beyond with cooperation with MDOT and the local agencies.

Jim, here, is an expert on this. Did I leave anything out?

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): That sounds like a good summary.

MORRIE HOEVEL, FEDERAL HIGHWAY ADMINISTRATION, LANSING (CONSUMER-GOVERNMENT PROCUREMENT): The other exciting component about that is that another ITS project, called SMART, which Mac here administers, is composed pretty much of the same geographical grid to a large degree, and is well along in putting in the Advanced Transit Management Systems.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): That's right, and that's part of the core infrastructure.

MORRIE HOEVEL, FEDERAL HIGHWAY ADMINISTRATION, LANSING (CONSUMER-GOVERNMENT PROCUREMENT): **And** the two management systems are being integrated probably as well as any place in the country right now.

MAC LISTER, SMART (CONSUMER-PRIVATE TRAVELER): I would mention to the group over there that was concerned about paratransit services, that SMART does provide paratransit service throughout the Tri-county area, with the exception of those communities that chose to opt out of the millage.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): In fact Oakland was the last one that is being offered services.

MAC LISTER, SMART (CONSUMER-PRIVATE TRAVELER): By the end of January.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): What we tried to do here is combine these two maps into one, with the services that you are familiar with and the subsystems that you are familiar with, and so that is what is repre-**sented** on this map. Now I'd like you to move on with the tasks, and discuss at your tables, how you would take this $20 million and use it over the next couple of years in the way of Deployment in Southeast Michigan strategically so that we might both accomplish our longer term goals, and meet the criteria for Model Deployment. Ivy?

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B): Two things. Number one: This funding, we're assuming $20 million. Should we anticipate that to be re-occurring or just a one-time shot.

KUNWAR RAJENDRA, MICHIGAN DEPARTMENT OFTRANSPORTATION (FEDERAL & STATE GOVERNMENT-STATE): A one time shot.

MORRIE HOEVEL, FEDERAL HIGHWAY ADMINISTRATION, LANSING (CONSUMER-GOVERNMENT PROCUREMENT): You should mainly plan on it being a one-time shot, in that your proposal should, at this time, for the most part stand on its own. There is a possibility of 1997 and subsequent legislation also containing funding for Model Deployment, but that's an unknown. And so I think as well review these proposals in a March or April time frame as they come in, they are going to have to be those show what they can accomplish on a one-time basis, are going to have the best opportunity of being selected.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): I'd like you to start, as we could talk about this all day.

ALBERT MARTIN, CITY OF DETROIT DEPARTMENT OF TRANSPORTATION (LOCAL GOVERNMENT-LOCAL): You labeled this segment "Let's Get Real," and I think there is nothing better. There is no better label, because we have to recognize, and unless we come up with something, that is going to service the major corridors of this total region, we're going to run into politics, we're gonna have real political problems, and so I think somehow we are gonna have to look at how we can do it, and service the entire region, if nothing more than the main corridors that go to all of the Tri-Counties. But something like that is gonna have to be done. Otherwise, we are going to find ourselves in political battles, that will stall us and we will not get anything.

ED GREENE, FORD MOTOR COMPANY (AUTO MAKER-COMPANY C): Our view of what we were talking about when we were talking about these microwave beacons that could service many different functions. I mean we were talking about the auto makers, US car, electronics industry, getting together, doing a chip-set that you come out with, you know that for $5-$10 you got a chip-set that you put into the car. When you start talking about having to lay links and stuff, if you have intersections that already have coordinated signal control, you could make it so we're changing the messages that you were sending out from that transceiver, just with existing wires. You wouldn't have to change anything in your system as far as installing new wires or anything, because you already have communication to all of the intersections. So all of your major intersections have traffic lights, and they already have communication in these areas, and a lot of these things we were talking about you could have static things that provide a lot of value that are nothing more than just a hookup of existing electricity if it's there, or it even could be a solar cell. So, we're talking maybe $1,000 per mile, and that makes a whole different decision, then, if somebody is saying that in order to do this, it is going to cost me $100 thousand dollars a mile, which is the number that has been talked about up here. I think that is something that people should take into consideration, when they are thinking about what it is they can deploy.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): All right.

ALBERT MARTIN, CITY OF DETROIT **DEPARTMENT OF TRANSPORTATION (LOCAL GOVERNMENT-LOCAL): How** much time do we have?

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Twenty minutes at the most. Let us know when you are finished.

[BREAK FOR GROUP WORK]

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): I'd like to begin, and go around counter-clockwise, starting with the Auto Makers table. And if you'd like skip over a table, or either way it's fine with me.

[Participant-suggested Revised Strawman Plans are given in Appendix K of the ITS

Deployment Exercise Summary Report.]

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B): I'm gonna be brief this time, and the reason is that I think we concluded in our industry that we'd rather see the money better spent in infrastructure. And we would support it to whatever extent is necessary. Kind of a "Build It and We Will Come" technology approach. We can see a lot of benefits, looking at the slide, to the customer, which I'm assuming is our driving public. Moving stock, so-to-speak.

But right now there is a big shortage of traveler information. Some of the sensing, the incident management, toll collection, etc. And I think at the point where that is in place, the Automotive companies, our industry will spend, if you will, our own money, to gain access to that.

I think, in a nutshell, that is it. Any questions, comments?

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Well, I have the comment that I think that automotive industry support will be important.

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B): Absolutely, I think we will support these programs, because you know it's a team effort. Even though I think right, or industry thinks right now, that the money should be spent on infrastructure. Being the ultimate users, we'd like to stay in the loop, and we would certainly want to participate in this program, in an advisory capacity. You know, if you are talking about funding, I guess we would fund whatever equipment is required on the vehicle side, and even that could be leveraged with those entities that are interested in providing that sort of equipment. Suppliers, and so on. The discussion we had at our table here awhile ago, is that the Auto industry doesn't necessarily have to be the communications expert. Just like today, we didn't participate in the definition of the AM Broadcast Band, or FM Broadcast, or Cellular or any of the other communications modes. However, we are providing radios, and cellular telephones, and access in our vehicles for those services. I don't see that a scenario is any different for communicating the highway traffic information, etc., to our customers.

GREG COOK, ANN ARBOR TRANSPORTATION AUTHORITY (INTEREST GROUPS-TRANSPORTATION DISADVANTAGED): Well, the interest groups struggled a little bit with all this technology that we feel supports the infrastructure on the main corridors, particularly the freeways, that technology is advancing through some of the community, but we think that the money ought to be maximized so that auto and other folks will get behind that, and the more visibility that is, the better chance of additional funding, so we would put the $20 million on the main corridors.

JOSEPH SAUL, INFORMATION TECHNOLOGY DIVISION, UNIVERSITY OF MICHIGAN (INTEREST GROUPS-CIVIL LIBERTIES): And watch it with the probes.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): All right. Now for the research group.

DONALD ORNE, P. B. FARRADYNE (RESEARCHER-CONSULTANTS): Just going back for a quick reminder of where we started with our priorities. For this exercise, it appeared the leadership, politics aspect of it is most important, because if you stop to think about [what] Model Deployment is all

about. It is political visibility, it is keeping the program sold, keeping us moving forward, so we tried to concentrate in that area. The number one priority that we selected for the researcher is again, to remind you it was in the emergency services management area.

So in that context, we ask ourselves: How can [we] most effectively leverage so that we can accomplish our aims, and yet find another of OPM, Other People's Money? And we think there are two viable areas. One is that there has been a long-standing debate nationwide and also in the State of Michigan as to where you deploy fiber. And if fiber is allowed to be deployed on interstate rights of way, and along arterial streets more than it has been so far, then a quid pro quo, as it has been practiced elsewhere is that, some of that is made available for these kinds of purposes. And so that's one opportunity.

The other opportunity in this state is that the State Police are deploying a state-wide microwave system, and it will be available, I understand, for all State agencies, or all government agencies, so that is another way of looking for communication. Now this all comes from a premise that something in the order of three quarters of the costs of deploying these systems is for communications, and so if we use those as a premise for getting help in the communication area, which is three quarters of the costs, it also feeds in very nicely into NII: the National Information Infrastructure, as a component. So it's a case of everybody wins. And then you start plugging in components to the fiber and microwave backbone. We identified for purposes for emergency services management, we need surveillance. So how much surveillance do we need?

Well, we estimated, first of all, probes. These can be vehicular probes, that are talking in a limited range sense to roadside communication terminals. We figured we probably handle the whole Metropolitan area with 500 probes. And if that is $1000 or $2000 per installation, we still have a lot of money left over for other things.

Then you start thinking about Response Devices or Response Mechanisms. Changeable message signs can be driven by being tapped into these communication networks, and other devices, so we did not get down to the point of a final costing. We ran out of time, but the premise, we think, is solid, and it allows an opportunity for a really comprehensive broad-wide area of deployment, within a $20 million dollar budget.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Communications.

TOM WISSING, EATON CORPORATION (TELECOMMUNICATIONS/ELECTRONICS-AUTO SUPPLIERS): We don't want all your money. We just want part of it. And we have two things: Mayday and Driver Information. And so our approach was to use [a device from a major equipment provider]. It has GPS, a modem, and everything in it. I guess it sells for $500; we're going to sell that each and every customer for $250, so you are gonna installation free because it's gonna get a cellular phone, and we're gonna get the installation free from [a major service provider].

So what do we use for dispatch? We're gonna use [a dispatch system from a major manufacturer], and that's gonna be part of their cost sharing, so we're gonna get that free. Next thing that we're gonna do is equip 4000 vehicles, with a cost for that at $1,000,000 and it is going to be deployed across the entire area.

The next thing we have is the driver information. How are we gonna get the driver information to our people for a low cost? We're gonna use that Mayday box for its GPS, and we're gonna add the side-band FM to that. We can buy those things for about $300. Right now $375 was the quote for one. So we figure we can get those for roughly around $200 at cost, and we don't need all the box in there; we'll put our own box in there. So we're gonna equip another 400 vehicles for $1 million.

Okay, we got Development Costs. We've got to get the GPS and that hooked up and talking to the side-band FM box, the RBDS. So we figure that is gonna cost us about $400,000 in Development Costs. Cost sharing that gives *us $200,000.*

The next thing we need is an FM station. We were told we could assume that we will have access to a public FM station, but they need some hardware, and we needs some dispatch there, and message compilation area, so we added another $300,000 for that. Apparently the hardware is only about $10,000; so we need another million and one-half.

Now we have Driver Information and Mayday deployed across the whole area in 4000 vehicles. However, we'd like to up that. So our approach is to go back to [the major equipment provider anticipated to provide the basic device foundational to the Mayday function], get them to cost share and increase the amount and number of vehicles.

TOM WISSING, EATON CORPORATION (TELECOMMUNICATIONS/ELECTRONICS-AUTO SUPPLIERS): That's all we need.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): Good. We'll use it. [LAUGHTER.]

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B): Tom, what is your level of confidence?

TOM WISSING, EATON CORPORATION (TELECOMMUNICATIONS/ELECTRONICS-AUTO SUPPLIERS): Of what?

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B): Of your proposal.

TOM WISSING, EATON CORPORATION (TELECOMMUNICATIONS/ELECTRONICS-AUTO SUPPLIERS): As good as yours. You just said you were gonna do it free, **but** I didn't free but I didn't mention that. You're gonna have all that in your car, but not by the time this happens, so we're gonna have to put some in.

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B): I'll say that we'll develop our half of it, if the infrastructure does their half of it.

TOM WISSING, EATON CORPORATION (TELECOMMUNICATIONS/ELECTRONICS-AUTO SUPPLIERS): The beauty of this thing is that we don't need much infrastructure here; we're taking all the money and putting it into the hardware in the vehicle, so we can get a lot of vehicles out there. We think that we need a lot of vehicles out there, because we need to demonstrate. We need to Show and Tell.

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B): Back up a little bit. First of all, RBDS is a very low data rate. I question you can supply the entire Metropolitan area with individualized hazard warning, or Mayday. Mayday, first of all, you'd be two-way. If you use the [device from the major equipment provider anticipated to provide the basic device foundational to the Mayday function], somebody's . . .

TOM WISSINC, EATON CORPORATION (TELECOMMUNICATIONS/ELECTRONICS-AUTO SUPPLIERS): No, Ivy, that doesn't have anything to do with the Mayday. We've got: cellular phone goes over Mayday. RBDS is the thing that broadcasts the traffic information. Right. But it's a low data rate, it's wide area. But we certainly won't be broadcasting tons of that stuff. You broadcast a few thousand bits, and that's all that there is. What we're broadcasting is the WJR traffic information that Neubacher does.

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B): If you do that, what is going to be the motivation for me to buy your box, or to even get involved? I can tune to Traffic Information.

TOM WISSING, EATON CORPORATION (TELECOMMUNICATIONS/ELECTRONICS-AUTO SUPPLIERS): No, the beauty of it is that you get it when you need it, and it's only for your area.

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B): That's the question that I have. How do you get it for your area--recognizing the size of Metropolitan Detroit. Recognizing that in snow storms or peak times you are going to need to have a lot of information broadcast over that channel.

JAY ASEL, AMERITECH (TELECOMMUNICATIONS/ELECTRONICS-COMMUNICATIONS): I think what we're gonna use is the GPS system. It will tell the vehicle location and tie them together, and say: Give me information for where I'm at. And maybe you input where you are going.

IVY RENGA, CHRYSLER CORPORATION (AUTO MAKER-COMPANY B): That's a filter.

TOM WISSING, EATON CORPORATION (TELECOMMUNICATIONS/ELECTRONICS-AUTO SUPPLIERS): Yeah, that's right. That's used as a filter, but what we are basing our stuff on is apparently somewhat successful in Ann Arbor. It's been tried. It works. So, it's an issue. Ivy, we don't have all the answers, here, but we think it's a heck of a good approach. At least to give it some consideration.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Thanks, a lot, let's go on.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): Going back to our priorities again of Throughput, Safety, and providing Pre-Trip information, the local

government feels that what we really need to focus on is instrumenting the major arterial roads that are currently not instrumented within the Metropolitan area. And we've identified a great many of them, and the nice thing about it is that they are all under a single jurisdiction. So we avoid all these interjurisdictional barriers, Kunwar.

But what we are talking about is primarily providing signal coordination, instrumentation, along these roadways. We're gonna need a communications backbone, so we're gonna be negotiating with Ameritech to provide that to us for a relatively low cost. We think we can do this for $15 million. This is the biggest chunk of our proposal.

Now, we also believe a major component of the core infrastructure and model deployment has to be with the public transit system. And one of the things we've been criticized for here in Metropolitan Detroit, maybe is that we have separate transit systems that are currently uncoordinated, so what we're proposing to do is spend an additional $1.2 million to provide transit service coordination between DDOT and SMART, and we're gonna do that by equipping all of the DDOT buses with AVL capabilities, and providing some hooks to the SMART dispatch for service connectivity at the service area boundaries, and at the same time those AVL-equipped buses can be used as probes to provide us with travel-time information, throughout the Metropolitan area, not just the in the SMART service area, but also now in the DDOT area, so we're covering the area with probe vehicles already.

Now, we liked what you said also. We'd like to take advantage of the information dissemination capabilities that you have now provided to us. We've set aside $3.8 million to do what we believe is necessary to do some systems integrations here and to develop the interfaces necessary to provide that information, and so we'll take your $2.5, we'll add another $1.3 to that for information integration services for fusion of the information, and the provision of that information.

So, in a nutshell that's it. And we think we'll win with that strategy. Comments? Questions?

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Okay, let's move on to the Consumers.

PAUL LESCOE, US ARMY TANK/AUTO COMMAND (CONSUMER-COMMERCIAL VEHICLES): Okay, our first step in our proposal would be to take a existing area within this State, and try to emphasize the existing core efforts to achieve full, complete, deployment of all the elements of ITS in a single area. So the way to do that fast is to (from this chart) derive where we've invested the most money, where we're closest to 100% completion and show in our proposal how we can get to 100% achievement. There we have actually, then, a test bed area, fully capable, that is more scientific and quantitative to base the deployment for the rest of the country on. And if you only do a partial solution, you won't get this full answer.

So we didn't put a cost associated with this. I didn't have the time or the competence to take Bob's numbers and try to say how much it will cost to do that, but if it's more than $20 million, or less than $20 million, maybe that's irrelevant, we should concentrate on what needs to be done here, possibly, and maybe try to go back and convince the government, or whoever, that our approach is better, and tell them why.

A second component would be to automate the International Border Crossing procedure in Southeastern Michigan. We just have to do it. We need to look at how that needs to be done. From the previous estimates, there isn't that much required to make that a more competent system, and so much money is being lost at that; it simply has to be addressed.

The third and final component, maybe the more unique and controversial component, we also through this procedure, coordinate all ITS activities in Southeast Michigan under a group called SEMTC, which would be the Southeastern Michigan Transportation Consortium. This would consist of all of these individual components that have been fighting here today and yesterday. MDOT, DDOT, Wayne, Oakland, Macomb, you know them better than I do. And they would concentrate on the specific RDE, Education, Outreach, and all these components that are different than placing brick and concrete down on the road, so this role would be very unique from the SEMCOG role.

BOB ERVIN, UNIVERSITY OF MICHIGAN (FACILITATOR): So it's a little institutional innovation.

PAUL LESCOE, US ARMY TANK/AUTO COMMAND (CONSUMER-COMMERCIAL VEHICLES): Yeah, we needed a little bit of institutional interaction.

BOB ERVIN, UNIVERSITY OF MICHIGAN (FACILITATOR): What is this thing? It isn't a not-for-profit organization, is it? What is this thing? It's not the Metropolitan Planning Authority.

PAUL LESCOE, US ARMY TANK/AUTO COMMAND (CONSUMER-COMMERCIAL VEHICLES): San Francisco had this. A billion dollars goes through there each year. Each organization had one vote. Each organization would have to cough up the money to build the infrastructure, and then bring in the second tier of people, which would be the auto companies, communication, and the advertising.

CHIP WHITE, UNIVERSITY OF MICHIGAN (RESEARCHER-UNIVERSITIES): Very similar to the group, a consortium that we're thinking about for MOTORCITI.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): What we did is we took our priorities, looked at System Throughput, talked about Advanced Traveler Information Systems, Adaptive Highway Traffic Signal Control, and we looked at this on a regionalized basis, a total region, not singling in on one area, but looking at the whole region, and how we can coordinate the efforts there.

In the area of Safety and Security, we looked at the incident management and public transportation, and the integration of transportation modes. Don brought up the fact that the State of Michigan is implementing a 800 MHz telecommunications system. We need to use that as kind of a backbone for a lot of our communications networking through here, and to bolster up our Safety and Security. I think we'll be very strong in that area, but to take very little money out of this, but to piggy back onto the State system, I think, is a good marriage for that. Question?

RUSS GRONEVELT, WAYNE COUNTY DEPARTMENT OF PUBLIC SERVICES (INTEREST GROUPS-ENVIRONMENT): I have a question, Jim. Is that possible? Is that system designed with that kind of surplus capacity.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): Yes, it is. What we have right now, Russ, is we have 2000 State users in Phase 1, which is the Lansing-Detroit, and we have 3000 local users in that same area, so we have 5000. We can have up to 60,000.

The Governor's hope is that we get to the point where we can even access public and mass transportation on it, and school buses can have radios in there, and use those for emergency-type basis.

[6. Facilitator Generates a Consolidated Strawman Deployment Plan]

[A preliminary discussion was held to generate a Consensus Strawman Deployment Plan out of the various perspective plans, but time did not allow for much progress. Thus, this work was, in most part, postponed and the facilitators attempted to craft a Consolidated Strawman Deployment Plan after the workshop was completed.]

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Right now I'd li ke to have a little general discussion, and I'll start out by floating an integrative trial balloon and see how people respond to this. It seems to me that there is room for combining some of these proposals into a single proposal, starting with the local government proposal which nobody responded to but I thought was a very nice proposal. Taking the MDOT Deployment of the surface streets as recommended, the transit integration and the more complete integration and you, Jim, picked up on the possibility of combining the telecommunications proposal, which was **a bare-bones,** stripped-down, what-can-we-do-for-this-given-amount-of-money traveler information system proposal. I think that those two are very complimentary. Not incompatible with Ivy's proposal, which was to solicit auto company support, developing vehicle products and services, but staying on the vehicle side, and not getting into the infrastructure. Ivy was going to leave the money for the infrastructure, and I thought that was pretty generous of him. And then there is also the Consumer's proposal on the institutional side, which looked very much to me as Chip mentioned, like the MOTORCITI proposal that [we've] already been working very hard to develop, where the Road Commission and MDOT have proposed to solicit support or a contractor that could pull together and integrate traffic information from a whole variety of sources. I think all of those ideas come together into one relatively inexpensive package and I'd like to get some response to that. Tom?

TOM WISSING, EATON CORPORATION (TELECOMMUNICATIONS/ELECTRONICS-AUTO SUPPLIERS): I was surprised that we didn't have a proposal to take your information and MITS information and put that out on a cable network on a cable station to all of the Metropolitan area.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): We didn't show that specifically, apparently, but our last thing about information dissemination would include pre-trip planning information over a broad area of different needs. That was the intent.

BRENT BAIR, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-COUNTY): We're already doing that in Oakland County with TCI and the Rochester Hills area, putting out colored maps, etc. showing where congestion is based on the input from our system. We see that as expanding.

TOM WISSING, EATON CORPORATION (TELECOMMUNICATIONS/ELECTRONICS-AUTO SUPPLIERS): TCI is?

BRENT BAIR, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-COUNTY): Cable company.

TOM WISSING, EATON CORPORATION (TELECOMMUNICATIONS/ELECTRONICS-AUTO SUPPLIERS): Oh, okay.

BRENT BAIR, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-COUNTY): So people can call up on their TV. We're hooking in with Ivy and the Chrysler Center so that all their monitors that will appear as they are leaving their offices will show where congestion is. This, we see, as going region-wide openly, and if we can get the major corridors now hooked up under our proposal, we'll be able to offer a great deal of information to the public like that.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): It's gonna require some integration effort to combine the data from all of these various sources, too. So that's why we put integration and information dissemination, because that's really what's required to do that.

BRENT BAIR, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-COUNTY): The answer is yes, we want to do it.

JOSEPH SAUL, INFORMATION TECHNOLOGY DIVISION, UNIVERSITY OF MICHIGAN (INTEREST GROUPS-CIVIL LIBERTIES): Once you've got that information assembled in a form ready to go out over cable, you could serve it to the . . . , at very low cost to you, and essentially free cost to anybody whose already got net access from work, which would be extremely useful.

KUNWAR RAJENDRA, MICHIGAN DEPARTMENT OF TRANSPORTATION (FEDERAL & STATE GOVERNMENT-STATE): It is part of our Deployment Program that you have the map here, or the next year and a half that it is going to be deployed. There is going to be a graphic display system with the whole 180 miles of the freeway system that will be available on the PC's It's a color-coded, real-time, congestion level on the freeway system that you can tap into. That would be put on also.

JOSEPH SAUL, INFORMATION TECHNOLOGY DIVISION, UNIVERSITY OF MICHIGAN (INTEREST GROUPS-CIVIL LIBERTIES): One thing that is implicit in what I'm saying, is distribute it in a form that does not require specialized software to read it. In

other words, distribute it as a graphics file, have a web page, sell advertising space on the web page, if you must. I mean it's a good idea to do that. I bet Ameritech would like the spot.

KUNWAR RAJENDRA, MICHIGAN DEPARTMENT OF TRANSPORTATION (FEDERAL & STATE GOVERNMENT-STATE): We're already working on that.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): So are we moving in the direction of an integrative proposal, and if not what would the concerns be about what I'm floating here. Oscar, did you have a comment?

OSCAR VILLALVAZO, JR., ROCKWELL INTERNATIONAL (RESEARCHER-AEROSPACE): Well, it's interesting, and I'm just thinking down the stream that we put all our eggs in our basket for $20 million or whatever it turns out to be. But it is interesting that we didn't see any revenue-generating ideas pop out of this. There was for like the people who are selling hardware, because there was product that were being sold, but for the RCOCs, the Wayne Counties, and the MDOT that are now packaging Strategic Information in such a way. I'm just surprised that I didn't see it pop out.

KUNWAR RAJENDRA, MICHIGAN DEPARTMENT OFTRANSPORTATION (FEDERAL & STATE GOVERNMENT-STATE): It's not part of this discussion, but like Chip mentioned a couple of minutes back, as part of the MOTORCITI and Steve also mentioned the MOTORCITI program is going to hit that issue.

PAUL LESCOE, US ARMY TANK/AUTO COMMAND (CONSUMER-COMMERCIAL VEHICLES): If we're talking about Southeast Michigan also, maybe the revenue generating is that the area works more efficiently, you get to work easier, you're trucks and services get to their destination, and therefore your company becomes more efficient and productive, and that's where your revenue will be generated as well. That's separate from selling widgets.

TOM WISSING, EATON CORPORATION (TELECOMMUNICATIONS/ELECTRONICS-AUTO SUPPLIERS): There's a difference. You said income-generating and that makes me cringe a little bit, because I'd like something for nothing always, and I look at it and it's sponsorship is the one that sticks in my mind. If you have to have a user fee, maybe it's 50 cents extra that I pay on my cable monthly bill. That, I don't even see it. Something of that nature, as opposed to I have to subscribe to this like an HBO channel, that turns me off BigTime.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): It wouldn't be that.

CHIP WHITE, UNIVERSITY OF MICHIGAN (RESEARCHER-UNIVERSITIES): Tom, I don't think that was really the intent.

TOM WISSING, EATON CORPORATION (TELECOMMUNICATIONS/ELECTRONICS-AUTO SUPPLIERS): It should be like the Weather Channel.

CHIP WHITE, UNIVERSITY OF MICHIGAN (RESEARCHER-UNIVERSITIES): We returned to the development of an ITS industry, which would need a revenue stream, or the potential for a revenue stream. And where would those potentials be available in order to incentivize the private sector coming into it.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): That's one concern, and the other one, I think, is the 0 & M question, and I think the RFI even addressed that as one of the concerns that they wanted comment from. And of course we're interested, in somehow or another, generating revenue to sustain our operation. Those sensors cost a lot of money to maintain, and the information systems we're developing cost a lot of money to maintain. We need to somehow or another, figure out how we can generate sufficient revenues to do that. I think we're going to have to really put our heads together on that one. And a lot of it is gonna be through possible sponsorships, costs savings, donations, etc., etc. But I think at some time, at some point, like through MOTORCITI, we're going to have to figure out how the bucks are gonna start rolling in on this. And I think the big ones are in the commercial vehicle operations, to be quite honest with you.

OSCAR VILLALVAZO, JR., ROCKWELL INTERNATIONAL (RESEARCHER-AEROSPACE): Another area that I thought was kind of interesting, is that I think that Deployment here kind of gives us a false sense of maturity. ITS is basically still in the real-world live applications of I R & D. I think Ivy said it best about when we were talking about ABS and bumpers, you know, we go put all of this stuff in. Do you really get all of that bank for the buck? That's still a little bit of research and development; that's still a study area. We've been treating it like it's been proven, it's gonna work, and so therefore try it. It's not.

EDWARD GREENE, FORD MOTOR COMPANY (AUTO MAKER-COMPANY C): I disagree. I mean I agree with you a 100%. I disagree with your comment that we are treating as though it is really here. This whole thing is a showcase. All of our approaches are nothing more than a showcase to educate people and to do a show and tell. Period.

MORRIE HOEVEL, FEDERAL HIGHWAY ADMINISTRATION, LANSING (CONSUMER-GOVERNMENT PROCUREMENT): There have been accumulated, recently, some pretty good benefits information, particularly relative to ATMS and ATIS. And it's hard to get that out; hard to get in front of folks like yourselves here and what-not. But we've got some pretty good information that has come out of Canada, we've got some information from Minnesota, information from Detroit, Houston, and others there. What ramp metering does for us. What good incident management does for us. What ATIS does for us. So it isn't all starting; we don't have to go buy all that research. It got so darn expensive last night [at the ITS Deployment Exercise Game run], we obviously can't afford that. They were way behind on turning the reports out after they got moved up. We do have some of that. But getting that in front of everybody is very critical. The Benefits Information.

ED GREENE, FORD MOTOR COMPANY (AUTO MAKER-COMPANY C): What was interesting about the Game last night, was Telecommunications ended up with all the money, and today the biggest problem is getting all the communications fixed.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Okay, **Mac?**

MAC LISTER, SMART (CONSUMER-PRIVATE TRAVELER): Steve, I've been sitting over here for a while, and it really goes back to last night also. Sitting in the consumer perspective. And I'm hearing all **of** this discussion gain, and I said it last night [at the ITS Deployment Exercise Game run], and I'm still confused as to what I'm gonna get. I do hear some level of transit information and traffic information, and display showing me on a page, what freeway is busy. But to a certain extent, what does that mean to me? I think that piece of it needs to be talked about a little bit further. Because it is still unclear to me as I sit here as a consumer, what more I'm gonna get that I don't get on WJR radio right now, or other kinds of mechanisms, and is that worth $20 million.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): That's a good question.

MAC LISTER, SMART (CONSUMER-PRIVATE TRAVELER): I still don't have a good picture.

JIM BARBARESSO, ROAD COMMISSION FOR OAKLAND COUNTY (LOCAL GOVERNMENT-REGIONAL): But I think that for this effort, the customer out there isn't really our customer. I think what we're trying to do is address a Federal customer here.

MAC LISTER, SMART (CONSUMER-PRIVATE TRAVELER): Yeah but the case can be made to the Federal customer, by making a case to the consumer. I don't think they are mutually exclusive.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): **Well the** consumer was on their chart. The customer, I believe.

DONALD ORNE, P. B. FARRADYNE (RESEARCHER-CONSULTANTS): Steve, we talked a little bit about that over **here, and a** emergency response, and we focused a **little** bit on incident management, and I think we recognized after awhile, that we were talking mostly about reaction to accidents. The post-accident clearance problem. And there are a lot of other dimensions to that and in our discussion we finally asked whether people even know that we are concerned about managing incidents, and the answer is probably not. So one measure of effectiveness of this whole model deployment activity would be: We're out there working on their **behalf.** We'll let you know about it; let you know what we're doing, and if you don't have any problems. It's success. It's kind of an inverse way of looking at it. But the whole objective of ITS, or one of the objectives, is freedom of movement, and if we can work this system in such a way that you are very seldom slowed down by incidents, then that is enhancing the freedom of movement.

MORRIE HOEVEL, FEDERAL HIGHWAY ADMINISTRATION, LANSING (CONSUMER-GOVERNMENT PROCUREMENT): Some of the best benefit information or some real good stuff relative to Detroit was generated as we did the early Deployment Planning Program for Detroit, and we generated that relative to Quality, Energy Savings, and Time Savings. Very well documented work, that can now be drawn out and flashed in front of the consumer.

[7. Facilitator Summarizes and Asks "What Comes Next?"]

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): If we're going to get out by five o'clock, we're going to have to start wrapping it up and we have a summary by Kan Chen and Tom Reed. I'd also like Kunwar to say a few words about where we take it from here, given that we can't solve all the problems this evening. But I'd like start with Kan, if you could do something of a summary and talk about this relationship to Strategic Planning.

KAN CHEN, UNIVERSITY OF MICHIGAN (AUTO MAKER-COMPANY A): Time is very short and I don't want to hold your ear.

First I want to say that I've personally learned a great detail today and last evening, and trying to pry into myself with the help of the State of Michigan for the Strategic Plan, there are four points I'd like to share with you.

First, I realize the importance of Outreach. Outreach not only in Southeastern Michigan, but also to other parts of the State, and the various Stakeholder Groups, and I learned how to use clout last evening, and I hope can properly influence people more effectively.

The second point which I got from my first-run interview had to do with focusing on the customer. And I think what I learned last evening is that a lot of people cooperated and put things in the middle, but we haven't gotten very much benefit out to the customer. So I think focusing on customers within our means and scarce resources is something we'll have to deal with seriously.

The third point has to do with revenue generation. That it is important from the standpoint that we get things started; we have to somehow maintain operational and maintenance costs built into there. And some of the major thrusts I've identified so far in Michigan:

Number One: The International Border Crossing, because there the truckers are going to have real savings, and there is a way of getting some revenue by collecting fees or something toward the main places or at the point of crossing. Another one is MOTOR-CITI. Maybe we'll have to collaborate and develop things, but that's another possibility to generate revenue to maintain momentum for this in Michigan.

The fourth and last point I wanted to share with you is that again as a result of my interview with about ten or twelve people: The most unique thing for Michigan in the ITS area is the presence of the auto makers--the Big Three or Big Four. It turns out that a lot of people felt that the BigThree or Big Four have not been involved in developing Public/Private Partnerships in ITS as much as originally anticipated. And it turns out that this is not only a Michigan concern. In my interviews with people in the Federal Government, I found it was also their concern. They feel that the original participation of the deep involvement of the BigThree/Big Four so far has not rolled out as much as originally anticipated. From that standpoint, my personal feeling is that when we talk about the Model Deployment, we've got to think about competition. Michigan is very strong, but not quite unique as compared to Minnesota, Seattle, Houston, and many other cities I could name. Perhaps we've got to think harder about how we can gain strength--again, the presence of the Big Four. In what

way can we put something together in the Model Deployment Quarter that will fully utilize that unique strength and in what way that combination can help the whole nation develop a Model Deployment that will multiply. Not just one try, but have something get started and it will propagate for other locations into something that will be more in full Deployment.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Kunwar, would you like to say a few words about what comes next?

KUNWAR RAJENDRA, MICHIGAN DEPARTMENT OF TRANSPORTATION (FEDERAL & STATE GOVERNMENT-STATE): All right. I think first of all I'd like to thank everybody here who took the time to come and participate in this program because it's really to help us to generate a better product for the whole State of Michigan. We started out with this idea of preparing the Strategic Plan for ITS for the State of Michigan, and then during that process we discovered that it would enrich this product very much if we could have a collective wisdom of everybody put into this by an excellent mechanism that has been developed here at the University of Michigan.

I was talking to Prof. Duke, and Steve, and Chip, and this has been used at several very important scenarios internationally and nationally and it's a privilege to be part of this program and to have been able to apply the product that we are developing here, and I really sincerely thank you for making this available to us, Steve, and Prof. Duke, and Chip. Not everyone can have this, and I was discussing with Prof. Duke earlier that maybe it should be put on CD-ROM and if we are to be participants allowed to buy stock in it or something.

From that point of view, I think I learned a lot and I think it's going to reflect in the product that you are going to see. Our plan is to have the Strategic Plan completed sometime in May, but that's not the first time you are going to be able to see it. Our plan is to have a draft as an interim product. However, the draft can be made available any time within the next few weeks. Four or five weeks or something. But the critical point is that the input from this forum has to be reflected in that. And I was talking to Kan about this thing, and we strongly believed that in order to have that input, to be part of that, and to be reflected in the Strategic Plan, it is important to have the input in our hands. We're thinking yesterday at that ITS Michigan Board of Directors Meeting, we were looking at holding a System Architecture forum in Michigan sometime in February when a draft of the System Architecture recommendations is going to be released, So we'd like to be the first to be able to host the forum to disseminate that information, We'd also like to use that opportunity to be able to present a draft of the Strategic Plan for Michigan.

But Kan Chen mentioned to me that in order to do that, we need to have about a month to have the input in hand, for its assimilation. So if we want to shoot for that, we'll be happy to do it. But I'm going to put this question to Steve and the staff here if we'll be able to have it available about a month in advance; maybe by the end of this month. Or maybe the first week of January, something in hand that can be used by Prof. Chen to include in this Strategic Plan. That we need to decide and talk about that. It will be a good idea to do it. The third thing is the core infrastructure roll out and Model Deployment issues can be talked about at that forum too, as well as making some presentations and discussing some of the things at that time.

This forum started on the premise that we will discuss the ITS Strategic Plan, but we very quickly added Model Deployment in that too, for obvious reasons. It is very timely, and it is the issue on everyone's mind that we need to be competitive. I wanted to make one thing clear that we know that there are lots of strengths that we have in Southeast Michigan and Michigan for being a strong candidate for that, but there are other areas too which claim that they have a lot of strengths, so we should not become complacent on thinking about the good things that we have and strengths that we have, but we are to look at some of the weaknesses we have also to be competitive. That is very important too, because there are things that some other folks may have that we may not have. It will be very important and very critical for us to look at those things that we need to strengthen and build.

It is very important for us to build the constituency. Public support and the politics to give a good support to us for ITS Programs. And that's why we single-handedly took upon ourselves, again through our own funding, to do an evaluation of the Deployment program that we are putting in. It's almost a $35 million program in Detroit, for those who are not aware of this thing. It's one of the largest programs of Deployment at this time in the Nation. However, we are concerned about it too, that what we deliver in this is acceptable, and people like it, and they are going to like it so much that they are going to come out and support us for future programs too. So we thought that we are going to embark upon a little bit of a risky path to do the evaluation and see whether it made a difference, and find out what difference it made.

We have put together a team between the University of Michigan and Michigan State University on different things. They will be doing some traffic analyses, ITS issue are going to be looked at here, and they started to develop a scope of services. We already have started some of the things to collect the data. Before data, after data, and during data--that will be all collected, evaluated and available, and that's what we're going to be doing.

There are lots of other things that we talked about last night. For example, uncertainly of resources, whether the partnerships are there are not, or whether they'll be available in the future or not, and we have to show some early results as quickly as possible for the same reason that I talked earlier. So there are lots of other things, but we can talk about those some other time, too.

Again, I thank everybody for the opportunity to receive your input, and if you still have any suggestions, recommendations, or comments, we will most welcome them. Send them to me, and we'll pass them on to Kan Chen, and as quickly as possible. I enjoyed it very much. Thanks.

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Thanks, Kunwar. Just in wrapping things up, I want to say that we should be able to have some materials available within the month. For example, we should have a transcript available, and at least the diagrams that we've all produced here. Something that is on the unprocessed side. So Kan, you should be able to capture most of the material from the workshop.

I'd like to thank everyone for attending. I know that Kunwar has done that, but I know that I twisted a few arms to get everybody here. I think the participation is better than I expected, and I'm just very happy that everyone was here and could be a part of this. I also want to thank Kan, and Bob, and Chip for advising on this project, but especially I want to thank the design staff, who is all sitting in the back, and who is going to be working with me to wrap all of this up. Without their help, this wouldn't have happened, and they've been working around the clock for the last week or so to make sure this came off, so I really appreciate their help on it.

In conclusion, it seems to me that we have a lot of work ahead of this, if we're going to be responding to Model Deployment. It's disappointing that these kinds of things come out over the Holidays, and I think it's a way to keep it out of the Federal Government offices and put it onto the Contractors. That we do need to get a summary of this out in relatively quick fashion in order for it be an input into the process.

Again, I thank everyone for attending, and I look forward to working with you on Model Deployment. Kunwar?

KUNWAR RAJENDRA, MICHIGAN DEPARTMENT OF TRANSPORTATION (FEDERAL & STATE GOVERNMENT-STATE): One other thing I wanted to react to in my comments. You won't believe how glad I am that one focus in the State of Michigan, which is this Deployment of ITS Programs, we've been able to get so much of time, and a broad cross-section of the industry and public sector in a room for this time. I don't recall any other event where this kind of synergy has been developed, and this mechanism is excellent, and I'd like to thank Prof. Duke and you. This is great!

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Thanks a lot.

CHIP WHITE, UNIVERSITY OF MICHIGAN (RESEARCHER-UNIVERSITIES): I think they deserve a round of applause. [APPLAUSE.]

STEVE UNDERWOOD, UNIVERSITY OF MICHIGAN (PROJECT DIRECTOR): Thank you. I've got the weekend coming.

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