

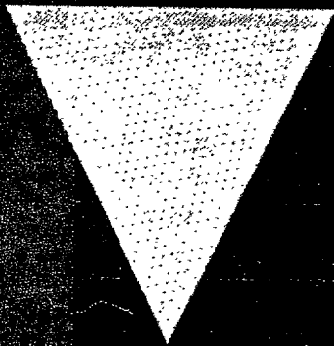
May 1995

Task 2 - Technical Memorandum

- Define Time Frames
- Match Needs with User Services
- Establish User Service Objectives

ITS Strategic Plan

The Early Deployment of Intelligent Transportation Systems (ITS)
In Maricopa County



Maricopa County
Department
of Transportation

Kimley-Horn and Associates, Inc.
Lee Engineering, Inc.
Catalina Engineering, Inc.
Rockwell International Corporation

Steering Committee Agencies

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ADOT
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DPS
Federal Express
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Peoria

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SECTION I - PROJECT OVERVIEW

Intelligent Transportation Systems (ITS) (formerly Intelligent Vehicle Highway Systems [IVHS]), is the application of advanced information processing, communications, vehicle sensing, and central monitoring and control technologies to surface transportation. The objective of ITS is to promote more efficient use of the existing highway and transportation network, increase safety and mobility, and decrease the environmental costs of travel (IVHS Primer, July 1993).

The Maricopa County ITS Strategic Plan is an effort undertaken by the Maricopa County Department of Transportation and a coalition of private and public agencies, to develop a plan for deploying ITS technologies. The vision for this project is to identify innovative ITS technologies for deployment in Maricopa County to satisfy regional transportation needs.

In December of 1991, the Intermodal Surface Transportation Efficiency Act (ISTEA) was adopted by Congress. ISTEA authorizes the use of federal funds for various transportation improvement projects over a six year period (1992-1997). ITS applications are a component of these federal aid program funds.

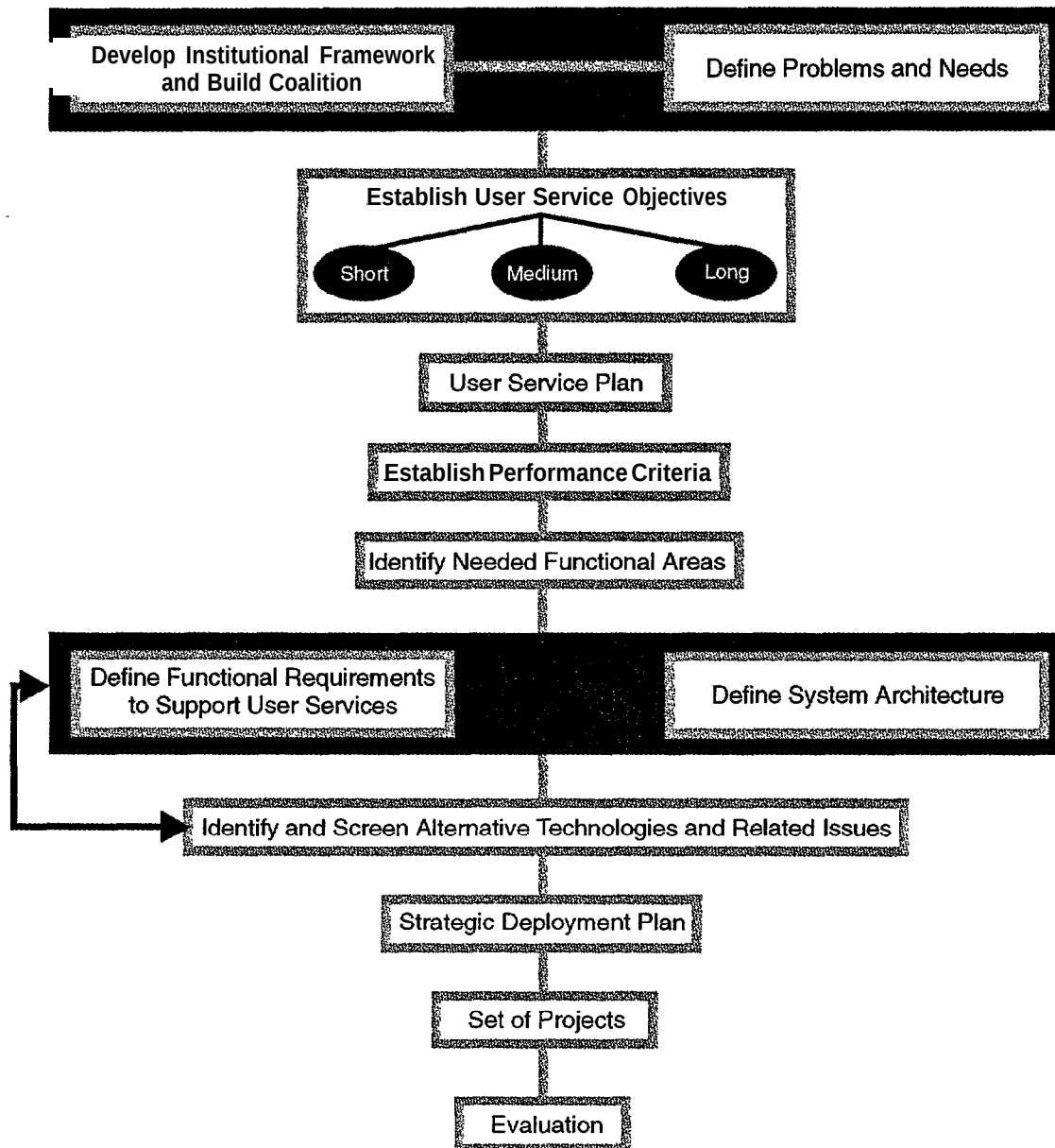
The Federal Highway Administration (FHWA) has developed a Planning Process (Figure 1) to aid local/regional agencies in the development of ITS Strategic Plans. In addition, a National Program Plan for ITS has been prepared to provide an overall framework to guide ITS investment decisions and promote ITS goals.

Maricopa County has outlined a process that closely parallels the National ITS Program Plan and FHWA Planning Process. It has been carefully subdivided into the following eight sequential tasks:

- Task 1: Examine the existing coalition/institutional framework for expansion and modification. Develop a vision statement and a mission statement with the coalition. Identify regional transportation needs and deficiencies with respect to safety and mobility.

- Task 2: Establish short-, medium- and long-range time frames. Based on the varying perspectives of the coalition members, list the short-, medium- and long-range needs of the present transportation system. Match local transportation needs with the associated ITS user services and develop the specific objectives necessary to achieve the user service goals.

Figure 1
ITS Planning Process



- Task 3: Develop a user service plan based upon the needs, goals, and objectives identified in Tasks 1 and 2. Identify and prioritize user services for short-, medium-, and long-range implementation.
- Task 4: Establish performance criteria and system measures that can be utilized as a standard to determine how successfully the plan will meet the user service needs, goals, and objectives.
- Task 5: Identify which combination of the FHWA's seven basic functional areas would best support the local user services. These seven functional areas include:
- . Surveillance
 - . Traveler interface
 - . Navigational guidance
 - . In-vehicle sensors
 - . Communications
 - . Control strategies
 - . Data processing
- Task 6: Based upon the functional requirements of the system, define the best system architecture.
- Task 7: Identify and evaluate alternative technologies on the basis of performance, reliability, costs, benefits, maintenance and operation requirements, and environmental impacts.
- Task 8: Develop a region-wide Strategic Plan that meets the needs, goals, objectives, and standards established in earlier tasks. The plan will include a set of projects for short-, medium-, and long-range implementation.

As a basic set of guidelines for these eight tasks, the project scope of work includes the following six goals:

- . Identify and document applicable ITS user services
- . Establish system performance criteria
- . Assess the functions and requirements of the system
- . Identify and evaluate potential technologies on the basis of performance, compatibility, flexibility, and cost
- . Assess potential funding and implementation options
- . Identify time frames for implementation.

SECTION II - TASK 2 OVERVIEW

The intent of the development of a strategic deployment plan is to provide a road map for how the goals of local and regional agencies and of private industry can be addressed through the deployment of a nationally compatible Intelligent Transportation System. In order for the plan to be successful, it must express the views, activities, and needs of a broad range of local stakeholders. For this reason, Maricopa County's ITS Strategic Plan must be user-oriented. Task 2 revolves around the specific issues and user services identified by the coalition in Task 1.

The development of user service objectives for ITS deployment in Maricopa County is the primary emphasis of Task 2. This objective development process actually began in Task 1 when the ITS stakeholders were identified and their transportation needs were solicited. From there, the following Task 2 efforts were performed in order to develop need-related user service objectives:

- **Formulate a problem statement based on the coalition-identified need.** Problems typically create a need. As a result, problem statements were derived which contributed to the need, either in full or in part. For coalition-defined needs, the problem statement was developed in the context of how the need was presented by the coalition. Other problem statements were also developed, based on previous studies and evaluations made in Task 1.
- **Develop the system objective based upon the problem.** A system objective was defined as the benefit that mitigation of the problem would have on the transportation network.
- **Match the need with appropriate FHWA user services.** While each FHWA user service may relate more directly to some needs and system objectives than others, those needs were included which seemed particularly relevant to the user service categories and thus represent needs for which there are ITS solutions.
- **Develop a user service objective that satisfies the system objective, mitigates the problem, and relates to the matched FHWA user service category.** An important aspect in developing this objective is that while individual travelers are the users of many services, local traffic and public transportation management agencies, commercial and public transportation fleet managers, and commercial vehicle drivers are users of provided services, as well .

In addition to the development of user service objectives, Task 2 efforts define short-, medium- and long-range time frames. The processes for developing user service objectives and appropriate time frames for implementation were presented to the Steering Committee for approval and comment.

SECTION III - MATCH NEEDS TO ITS USER SERVICES

One of the critical steps in developing user service objectives from the previously identified needs was matching the needs with one or more of the 29 FHWA defined user services. The match was made to the user service(s) that most closely addresses the need.

The following descriptions provide a brief overview of each of the user services grouped into seven “bundles” as defined by the National ITS Program Plan:

Travel and Transportation Management

En-Route Driver Information

Provides driver advisories and in-vehicle signing for convenience and safety.

Driver advisories are similar to pre-trip planning information, but they are provided once travel begins. Driver advisories convey real-time information about traffic conditions, incidents, construction, transit schedules, and weather conditions to drivers of personal, commercial, and public transit vehicles. This information allows a driver to either select the best route, or shift to another mode in mid-trip if desired.

In-vehicle signing, the second component of en-route driver information, provides the same types of information found on physical road signs today, directly in the vehicle. The service could be extended to include warnings of road conditions and safe speeds for specific types of vehicles, such as autos, buses, and large trucks, as well as for drivers of all types of vehicles. This service might be especially useful to elderly drivers, in rural areas with large numbers of tourists, or in areas with unusual or hazardous roadway conditions.

Route Guidance

Provides travelers with simple instructions on how to best reach their destinations.

The route guidance service provides a suggested route to reach a specified destination. Early route guidance systems are based on static information about the roadway network or transit schedules. When fully deployed, route guidance systems will provide travelers with directions to their destinations based on real-time information about the transportation system. The route guidance service will consider traffic conditions, status and schedule of transit systems, and road closures in developing the best route. Directions will generally consist of suggested routing and simple instructions regarding turns or other upcoming required maneuvers. Users of the service will include not only drivers of all types of

vehicles, but also non-vehicular travelers, such as pedestrians or bicyclists, who could get specialized route guidance from a hand-held device.

Traveler Services Information

Provides a business directory, or “yellow pages,” of service information.

Traveler services information provides quick access to travel-related services and facilities. Examples of information that might be included are the location, operating hours, and availability of food, lodging, parking, auto repair, hospitals, and police facilities. Traveler services information would be available en-route and accessible in the home, office, or other public locations to facilitate trip planning. When fully deployed, this service will connect users and providers interactively for quick dissemination of needed information. A comprehensive, integrated service could also support financial transactions, such as automatic billing for purchases.

Traffic Control

Manages the movement of traffic on streets and highways.

The traffic control user service provides for the integration of adaptive control of the freeway and surface street systems to improve the flow of traffic; give preference to public safety, transit, or other high occupancy vehicles; and minimize congestion while maximizing the movement of people and goods. Through appropriate traffic controls, the service also promotes the safety of non-vehicular travelers, such as pedestrians and bicyclists. It requires advanced surveillance of traffic flows, analysis techniques for determining appropriate traffic signal and ramp metering controls, and communication of these controls to the roadside infrastructure. This service gathers data from the transportation system and organizes it into usable information to determine the optimum assignment of right-of-way to vehicles and pedestrians. The real-time traffic information collected by the traffic control service also provides the foundation for many other user services.

Incident Management

Helps public and private organizations quickly identify incidents and implement a response to minimize their effects on traffic

The incident management service uses advanced sensors, data processing, and communications to improve the incident management and response capabilities of transportation and public safety officials, the towing and recovery industry, and other entities

involved in incident response. The service will enhance existing incident detection and verification capabilities to help these groups quickly and accurately identify a variety of incidents and dispatch appropriate responses, thus improving response time and minimizing the effects of these incidents on the movement of people and goods. This service will also help transportation officials predict traffic or highway conditions so action can be taken in advance to prevent potential incidents or minimize their impacts. While the direct users of this service are the public and private entities responsible for incident detection and response, the ultimate beneficiaries are all users of the surface transportation network.

- Emissions Testing and Mitigation

Provides information for monitoring air quality and developing air quality improvement strategies.

The emissions testing and mitigation service uses advance vehicle emissions testing systems to provide information to identify environmental “hot spots” and implement strategies to either reroute traffic around sensitive air quality areas or control access to such areas. Other technologies provide identification of vehicles that are emitting levels of pollutants that exceed state, regional, or local standards, and provide information to drivers or fleet operators to enable them to take corrective action. This service also provides transportation planning and operating agencies with information that can be used to facilitate implementation and evaluation of various pollution control strategies.

Travel Demand Management

- Pre-Trip Travel Information

Provides information for selecting the best transportation mode, departure time, and route.

Pre-trip travel information allows travelers to access a complete range of inter-modal transportation information at home, work, and other major sites where trips originate. Real-time information on transit routes, schedules, transfers, fares, and ride matching services are available to encourage the use of alternatives to the single occupancy vehicle. Information needed for long, inter-urban or vacation trips would also be available. Real-time information on accidents, road construction, alternate route, traffic speeds along given routes, parking conditions, event schedules, and weather information is also included. Based on this information, the traveler can select the best route, modes of travel and departure time, or decide not to make the trip at all.

- Ride Matching and Reservation

Makes ride sharing easier and more convenient

The ride matching and reservation service provides real-time ride matching information and reservations to users in their homes, office or other locations, and assists transportation providers, as well as van/carpoolers, with vehicle assignments and scheduling. This will expand the market for ridesharing as an alternative to single occupancy vehicle travel and will provide for enhanced alternatives for special population groups, such as the elderly or handicapped.

- Demand Management and Operations

Supports policies and regulations designed to mitigate the environmental and social impacts of traffic congestion.

The demand management and operations service generates and communicates management and control strategies that support the implementation of a variety of programs designed to:

- reduce the number of individuals who choose to drive alone, especially to work;
- increase the use of high occupancy vehicles and transit;
- provide a variety of mobility options for those who wish to travel in a more efficient manner, (for example in non-peak periods).

Demand management strategies could ultimately be applied dynamically, when congestion or pollution conditions warrant. For example, disincentives such as increased tolls and parking fees could be applied during pollution alerts or peak travel periods, while transit fares would be lowered, thereby motivating travelers to choose modes other than the single occupant vehicle. Such strategies will reduce the negative impacts of traffic congestion on the environment and improve overall quality of life.

Public Transportation Operations

- Public Transportation Management

Automates operations, planning, and management functions of public transit systems.

The public transportation management service provides computer analysis of real-time vehicle and facility status to improve transit operations and maintenance. This analysis identifies deviations from schedule and provides potential solutions to dispatchers and

drivers. Integrating this capability with traffic control services can help maintain transportation schedules and assure reliable transfer connections for intermodal trips. Information regarding passenger loading, bus running times, and mileage accumulated will help improve service and facilitate administrative reporting. Transit management is enhanced by automatically recording and verifying tasks performed by transit personnel.

- En-Route Transit Information

Provides information to travelers using public transportation after they begin their trips.

The en-route transit information service provides information to assist the traveler once public transportation travel begins. Real-time, accurate transit service information on-board the vehicle helps travelers make effective transfer decisions and itinerary modifications while a trip is underway.

- Personalized Public Transit

Provides flexibly-routed transit vehicles to offer more convenient customer service.

Small publicly or privately-operated vehicles provide on-demand routing to pick up passengers who have requested service and deliver them to their destinations. Route deviation schemes, in which vehicles leave a fixed route for a short distance to pick up or discharge passengers, also enhances service. Vehicles can include small buses, taxicabs, or other small, shared-ride vehicles. This service can provide almost door-to-door service, expanding transit coverage to lesser populated locations and with greater convenience than conventional fixed-route transit.

- Public Travel Security

Creates a secure environment for public transportation patrons and operators.

This service provides systems that monitor the environment in transit stations, parking lots, bus stops, and on-board transit vehicles, and generates alarms, either automatically or manually, when necessary. This improves security for both transit riders and operators. Transportation agencies and authorities can integrate this user service with other anti-crime activities.

Electronic Payment

Electronic Payment Services

Allows travelers to pay for transportation services electronically.

Electronic payment services will foster inter-modal travel by providing a common electronic payment medium for all transportation modes and functions, including tolls, transit fares, and parking. The service provides for a common service fee and payment structure. Such systems could be expanded to become truly multi-use, accommodating personal financial transactions that are made with today's credit/bank cards. The flexibility that electronic payment services offer will also facilitate travel demand management, when conditions warrant. For example, should local authorities choose to do so, congestion pricing policies, which could influence departure times and mode selection, could be enabled.

Commercial Vehicle Operations

Commercial Vehicle Electronic Clearance

Facilitates domestic and international border clearance by minimizing stops.

This service will enable transponder-equipped trucks and buses to have their safety status, credentials, and weight checked at mainline speeds. Technology is also being developed to provide an electronic seal on inspected shipping containers which can be scanned at mainline speeds to determine if the seal has been tampered with. Vehicles that are safe and legal and have no outstanding out-of-service citations will be allowed to pass the inspection/weight facility without delay.

By working with Mexico and Canada, a more efficient traffic flow would be provided at border crossings. The deployment of technologies in these countries could ultimately prevent overweight, unsafe, or improperly registered vehicles from entering the United States.

Automated Roadside Safety Inspection

Facilitates roadside inspections.

Automated roadside inspections would allow real-time access at the roadside to the safety performance record of carriers, vehicles, and drivers. Such access will help determine which

vehicle or driver should be stopped for an inspection, as well as ensuring timely correction of previously identified problems.

This service would also automate as many items as possible of the manual inspection process. It would, for example, allow for more rapid and accurate inspection of brake performance at the roadside. Through the use of sensors and diagnostics; vehicle systems, driver requirements, and ultimately driver alertness and fitness for duty could be quickly ascertained.

- On-Board Safety Monitoring

Senses the safety status of a commercial vehicle, cargo, and driver.

On-board systems would monitor the safety status of a vehicle, cargo, and driver at mainline speeds. Vehicle monitoring would include sensing and collecting data on the condition of critical vehicle components such as brakes, tires, and lights, and determining thresholds for warning and countermeasures. Cargo monitoring would involve sensing unsafe conditions relating to vehicle cargo, such as shifts in cargo while the vehicle is in operation. Driver monitoring is envisioned to include the monitoring of driving time and alertness using non-intrusive technology and the development of warning systems for the driver, the carrier, and the enforcement official. A warning of unsafe conditions would first be provided to the driver and then to the carrier and roadside enforcement officials. This warning notification would possibly prevent an accident from happening. This service would minimize driver- and equipment-related accidents for participating carriers.

- Commercial Vehicle Administrative Processes

Provides electronic purchasing of credentials and automated mileage and fuel reporting and auditing.

The commercial vehicle administrative processes service provides the commercial carrier with the capability to electronically purchase annual and temporary credentials via computer link, thereby reducing burdensome paperwork and processing time for both the state agencies and carriers.

To facilitate automated mileage and fuel reporting and auditing, this service enables participating interstate carriers to electronically-capture mileage, fuel purchased, trip, and vehicle data according to state. It would also automatically record mileage traveled and fuel purchased in each state, for use by the carrier in preparing required fuel tax and registration reports for the State agencies. This service would reduce the significant administrative

burden on commercial carriers to collect and report mileage and fuel purchased within each state.

- Hazardous Material Incident Response

Provides immediate description of hazardous materials to emergency responders.

The hazardous material incident response service enhances the safety of shipments of hazardous materials by providing enforcement and response teams with timely, accurate information pertaining to cargo contents, thereby enabling them to react properly in emergency situations. The materials or combination of materials involved when an incident involving a truck carrying hazardous material occurs would be provided electronically to emergency responders and enforcement personnel at the scene so that the incident can be handled appropriately.

- Commercial Fleet Management

Provides communication between drivers, dispatchers, and intermodal transportation providers.

The commercial fleet management service provides real-time traffic information and vehicle location for commercial vehicles to industry participants. This service significantly enhances fleet operations management by helping drivers to avoid congested areas and improving the reliability and efficiency of pickups and deliveries. These benefits are particularly important for operators of intermodal and time-sensitive fleets who can use this ITS service to make their operations more efficient and reliable.

Emergency Management

- Emergency Notification and Personal Security

Provides immediate notification of an incident and immediate request for assistance.

The emergency notification and personal security service includes two capabilities: driver and personal security, and automatic collision notification. Driver and personal security capabilities provide for user-initiated distress signals for incidents such as mechanical breakdowns or car-jackings. When activated by an incident, automatic collision notification transmits information regarding location, nature, and severity of the crash to emergency personnel.

- Emergency Vehicle Management

Reduces incident response time for emergency vehicles.

The emergency vehicle management service provides public safety agencies with fleet management capabilities, route guidance, and signal priority and/or preemption for emergency vehicles. Fleet management improves the real-time tracking of emergency vehicles to assist dispatchers in sending the units that can most quickly respond to a given incident. Route guidance directs emergency vehicles to an incident location, and signal priority and/or pre-emption optimizes the traffic signal timing in an emergency vehicle's route. Primary users of this service include police, fire, and medical units.

Advanced Vehicle Control and Safety Systems

- Longitudinal Collision Avoidance

Helps prevent head-on, rear-end or backing collisions between vehicles, or between vehicles and other objects or pedestrians.

The longitudinal collision avoidance service helps reduce the number and severity of longitudinal collisions, such as head-on, rear-end or backing. It includes the sensing of potential or impending collisions, prompting a driver's avoidance response while temporarily controlling the vehicle.

- Lateral Collision Avoidance

Helps prevent collisions when vehicles leave their lane of travel.

The lateral collision avoidance service provides crash warnings and controls for lane changes and road departures. It will reduce the number of lateral collisions involving two or more vehicles, as well as crashes involving a single vehicle leaving the roadway.

For changing lanes, a situation display can monitor the vehicle's blind spot continuously, and drivers can be actively warned of an impending collision. If needed, automatic control can provide rapid response to a situation. Warning systems can also alert a driver to an impending road departure, provide help in keeping the vehicle in the lane, and ultimately provide automatic control of steering and throttle.

- Intersection Collision Avoidance

Helps prevent collisions at intersections.

The intersection collision avoidance service warns drivers of imminent collisions when approaching or crossing an intersection that has traffic control (e.g., stop signs or a traffic signal). This service also alerts the driver when the proper right-of-way at the intersection is unclear or ambiguous.

- Vision Enhancement for Crash Avoidance

improves the driver's ability to see the roadway and objects that are on or along the roadway.

The vision enhancement service provides drivers with improved visibility to allow them to avoid collisions with other vehicles or obstacles in the roadway, and provide assistance with adhering to traffic control and regulatory measures. The service requires in-vehicle equipment for sensing potential hazards, processing this information, and displaying it in a way that is safe and useful for a driver.

- Safety Readiness

Provides warnings about the condition of the driver, the vehicle, and the roadway.

Safety readiness services provide in-vehicle equipment that unobtrusively monitors a driver's condition and provides a warning if the driver is becoming drowsy or otherwise impaired. This service could also monitor critical components of the automobile internally and alert the driver to impending malfunctions. Equipment within the vehicle could also detect unsafe road conditions, such as bridge icing or standing water on the roadway, and provide a warning to the driver.

- Pre-Crash Restraint Deployment

Anticipates an imminent collision and activates passenger safety systems before the collision occurs, or much earlier in the crash event than is currently feasible.

The pre-crash restraint deployment service anticipates an imminent collision by determining the velocity, mass and direction of the vehicles or objects involved in a potential crash. The service activates safety systems in the vehicle prior to a collision, such as tightening lap-shoulder belts, arming and deploying air bags at the optimal pressure, and deploying roll bars. The response is based on the number, location, and major physical characteristics of vehicle occupants.

Automated Highway Systems

Provides a fully automated, "hands-off " operating environment.

AHS is a long-term goal of ITS which would provide vast improvements in safety by creating a nearly accident-free driving environment. In AHS, the vehicle is guided automatically rather than by the driver. Driver error is reduced or possibly eliminated with full implementation. Drivers could buy vehicles with the necessary instrumentation or retrofit an existing vehicle. During the transition period, vehicles that are incapable of automated operation would drive in lanes without automation. AHS benefits include increased roadway capacity, enhanced safety, and reduced fuel consumption and reduced emissions.

Needs Matched with User Services

The transportation needs identified in the focus group meetings, in other studies, and in subsequent discussions with the steering committee are listed in Figure 2. The needs are grouped into the general categories of:

- Transit
- Institutional
- Funding
- Traffic Management
- Traffic Signals
- Traveler Information
- Fleet Management
- Other Needs
- Needs Identified in Studies

The needs are further matched with the appropriate user services. Please note that in many cases more than one user service is applicable as a potential solution to address a need. The matrix in Figure 2 identifies the user services that are required to address the transportation needs of Maricopa county.

Needs	User Services										Travel and Transportation Management	Travel Demand Management	Public Transportation Operations	Electronic Payment	Commercial Vehicle Operations	Emergency Mgmt.	Advanced Vehicle Control and Safety Systems	Other									
	User Services																										
	En-Route Driver Information	Route Guidance	Traveller Services Information	Traffic Control	Incident Management	Emissions Testing and Mitigation	Pre-Trip Travel Information	Ride Matching and Reservation	Demand Management and Operations	Public Transportation Management									Personalized Public Transit	Public Travel Security	Electronic Payment Services	Automated Roadside Safety Inspection	On-Board Safety Monitoring	HAZMAT Incident Response	Commercial Fleet Management	Emergency Notification and Personal Security	Longitudinal Collision Management
TRANSIT																											
More routes																											
Express routes to non-downtown locales																											
More frequent service																											
More hours of service																											
Improved safety on busses																											
Improved safety at bus stops																											
Reduced trip time																											
Real-time information on schedule																											
Rail system																											
Transit/shuttle busses for special events																											
Coordination of smart highway/traveler info. system, transit and ride share																											
Improve efficiency of existing bus routes and system																											
Additional and more accurate real time info. on transit locations, efficiency and ridership																											
Visual and/or sound announcements for handicapped transit travelers																											
Electronic transit fare collection																											
Automatic vehicle location for busses																											
Institutional																											
ITS Education																											
Coordination between agencies																											
Valley-wide uniformity of traffic control																											
Political support of ITS projects																											
Champion of ITS projects																											
More focus on moving people not autos																											
Funding																											
Use based funding																											
Major sources of funding																											
Traffic Management																											
Accurate, timely traffic reports to public																											
Communication b/w TDC and control operators																											
Freeway call boxes																											
Incident detection and notification to motorists																											
Central clearinghouse for incident information																											
More highway advisory radio																											
More HOV lanes																											
Quicker incident removal																											
Real-time in-vehicle displays of traffic information																											
Reduced "rubbernecking"																											
Special event control																											
More traffic signals in suburbs and rural areas																											
Traffic Signals																											
Computerized signal control																											
Regional signal coordination																											
Coordination between RMS and city signals																											
Increased manpower to operate/maintain																											
To implement MAGIC findings																											
Regional uniformity of emergency pre-emption																											
Reduced manual traffic control																											
Improve bandwidth of communication infrastructure																											
Aerial management system																											
Bus Pre-emption																											

Figure 2
Needs Matched with
User Services
Sheet 1 of 2

ITS Projects in Arizona Matched with User Services

There are numerous on-going or planned ITS projects in Maricopa County that provide a core infrastructure for the deployment of additional ITS user services. These ITS projects are listed in Figure 3. They are matched with the user services in a matrix format. Again, it is noted that the projects provide multiple user services addressing transportation needs in Maricopa County.

Needs	User Services										Travel and Transportation Management	Travel Demand Mgmt.	Public Transportation Operations	Electronic Payment Mgmt.	Commercial Vehicle Operations	Emergency Mgmt.	Advanced Vehicle Control and Safety Systems	Other									
	En-Route Driver Information	Route Guidance	Traveller Services Information	Traffic Control	Incident Management	Emissions Testing and Mitigation	Pre-Trip Travel Information	Ride Matching and Reservation	Demand Management and Operations	En-Route Transit Information	Personalized Public Transit	Public Travel Security	Electronic Payment Services	Automated Roadside Safety Clearance	On-Board Safety Monitoring	Comm'l Vehicle Admin Processes	HAZMAT Incident Response	Commercial Fleet Management	Emer. Notification and Personal Security	Longitudinal Collision Management	Lateral Collision Avoidance	Intersection Collision Avoidance	Vision Enhancement for Collision Avoid	Safety Readiness	Pre-Crash Restraint Deployment	Automated Highway System	Other Services
Traveler Information																											
Better highway identification	•																										
Better detour signing	•																										
More information on street operating conditions	•	•	•				•																				
Route/direction information	•		•	•			•																				
Parking information	•																										
More efficient parking payment	•																										
High water crossing warning and detour	•																										
Cost effective early warning notification at rural railroad crossings																											
Advance notice of animal crossings in rural areas																											
Fleet Management																											
Automatic vehicle location capability																											
May Day alert capability																											
Other Needs																											
Better integration of bikes and other modes																											
More extensive and integrable bike paths																											
More consideration for pedestrians at signals																											
Region-wide Dial-A-Ride																											
Increases of telecommuting																											
Increases in carpooling incentives																											
Computerized ride share program (Valley-wide)																											
Complete loop freeways																											
Congestion pricing for commercial vehicles																											
Improved long-range land use plan																											
Reduced congestion at airport	•																										
Separate comm'l and passenger traffic at airport																											
Alternative instruction methods (e.g. telecourse)																											
Traffic-free into regional bus services																											
Incubator/clinics/cafes for bicycle and transit travel																											
More transit data to plan infrastructure improvements																											
Needs identified in studies																											
Reduce accidents at congested one																											
Inter-Agency coordination	•																										
Implement congestion management methods																											
Improve regional mobility	•	•	•																								
A traffic status map for the region	•																										
Reduce number of incidents																											
Reduce congestion on streets and freeways																											
Provide motorists on alternate with extra traffic info during special events																											
Air quality monitoring to comply with clean air act	•																										
Arterial network coordination																											
Reduction in congestion and delay																											
Valley-wide uniformity of traffic control	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Accurate, timely traffic reports to public	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Incident detection and notification to motorists	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Regionwide communications infrastructure																											
Enhance incident management at freeway interchanges																											
Regional signal system database																											
Alternative communications technologies for deployment of ITS																											

N

Figure 2
Needs Matched with
User Services
Sheet 2 of 2

SECTION IV - ESTABLISH USER SERVICE OBJECTIVES

The individual user services and their related user service objectives are building blocks for the ultimate identification and deployment of appropriate ITS technologies. It is these objectives which must ultimately be achieved and linked to National ITS goals to form a framework for deployable products and services. This section presents the methodology employed to derive these objectives.

Problem statements were first defined based upon a need which was previously identified. In many cases, the problem statement was not the sole cause for the transportation need. The problem statement was defined based upon the match with the user service and how well the problem statement matches the need as originally presented by the stakeholder. Solving the problem would mitigate the need but may not totally alleviate it.

The benefit to the transportation system was then prepared based upon the problem statement. Many benefits may sometimes result from mitigating the problem; however, an attempt was made to identify the direct benefit associated with the transportation system.

A user service objective was then formulated based upon the problem, need, and system objective. It is important to note that the user service objectives were developed consistent with the framework of the National Program Plan for ITS. The identified user service objectives were consolidated and matched to five national ITS goals. Section VI summarizes the results of this consolidation and correlation to national goals. Detailed descriptions of each of the 57 identified user service objectives are included in the Technical Appendix.

Key user services and their objectives will be identified and researched further in Task 3,

SECTION V - ESTABLISH TIME FRAMES

The first step towards establishing short-, medium- and long-term time frames was to relate them to national and local transportation programs.

The national plan defines anticipated deployment of ITS based upon the following schedule:

<u>Term</u>	<u>Time Frame</u>	<u>Envisioned ITS Deployment</u>
Short	1997-1999	Travel Information/Fleet Management
Medium	2000-2005	Transportation Management
Long	2010	Enhanced Vehicles

The national plan defines the beginning of the short-term time frame (1997) to coincide with the reauthorization of ISTEA. Considering the typical planning, design, and implementation schedules of transportation projects, the short-term encompasses a relatively brief time frame (three years). This schedule reflects the desire by FHWA to implement, as quickly as possible, visible and effective ITS projects that will stimulate public support for the funding levels required to implement the future medium- and long-term deployment programs.

Identified deployment projects should, wherever possible, build upon ongoing efforts. Accordingly, ITS projects and programs which are currently underway in Maricopa County are summarized as follows:

- Phase 1 of the ADOT FMS which will be operational in the summer of 1995. Subsequent phases are currently scheduled for implementation through 2000.
- The MAGIC program which includes the implementation of nine demonstration projects. The current MAGIC schedule identifies a number of short-term projects or actions to be completed by 1996 as well as longer term projects to be implemented by 2002. One MAGIC project is programmed in the Five-Year regional transportation improvement plan for implementation in 1995/96.
- A number of traffic signal system upgrade projects are underway including Tempe, Glendale, Phoenix, and Chandler. These upgrades will be completed over the next five years.

These projects will contribute to the development of the basic system infrastructure needed to support various ITS technologies. In addition, a number of ITS projects have already been identified as part of MAGIC, and the accelerated implementation of several of these projects is supported by the MAGIC coalition.

Based on the previous discussion and presentation to the Steering Committee for review and comment, the following time frames have been accepted for the deployment of ITS technologies in Maricopa County:

- Short-Term 1995-1999
- Medium-Term 2000-2005
- Long-Term 2006andbeyond

These time frames reflect current project status and planned ITS project schedules as well as the current 20-year transportation planning period. The short-term schedule reflects on-going and committed ITS projects, provides a realistic implementation period (four years) for other projects which will be identified as part of the Maricopa county strategic plan, and is directed towards securing additional funding which is expected to be available from the next allocation of ISTEA funds.

SECTION VI - SUMMARY

The 29 user service categories and the 57 user service objectives are the building blocks for the ITS Strategic Plan. The intent of this section is to summarize and consolidate the objectives in order to determine the overall theme(s) for the deployment of ITS in Maricopa County. To accomplish this, the resulting user service objectives were matched to five national ITS goals. They are:

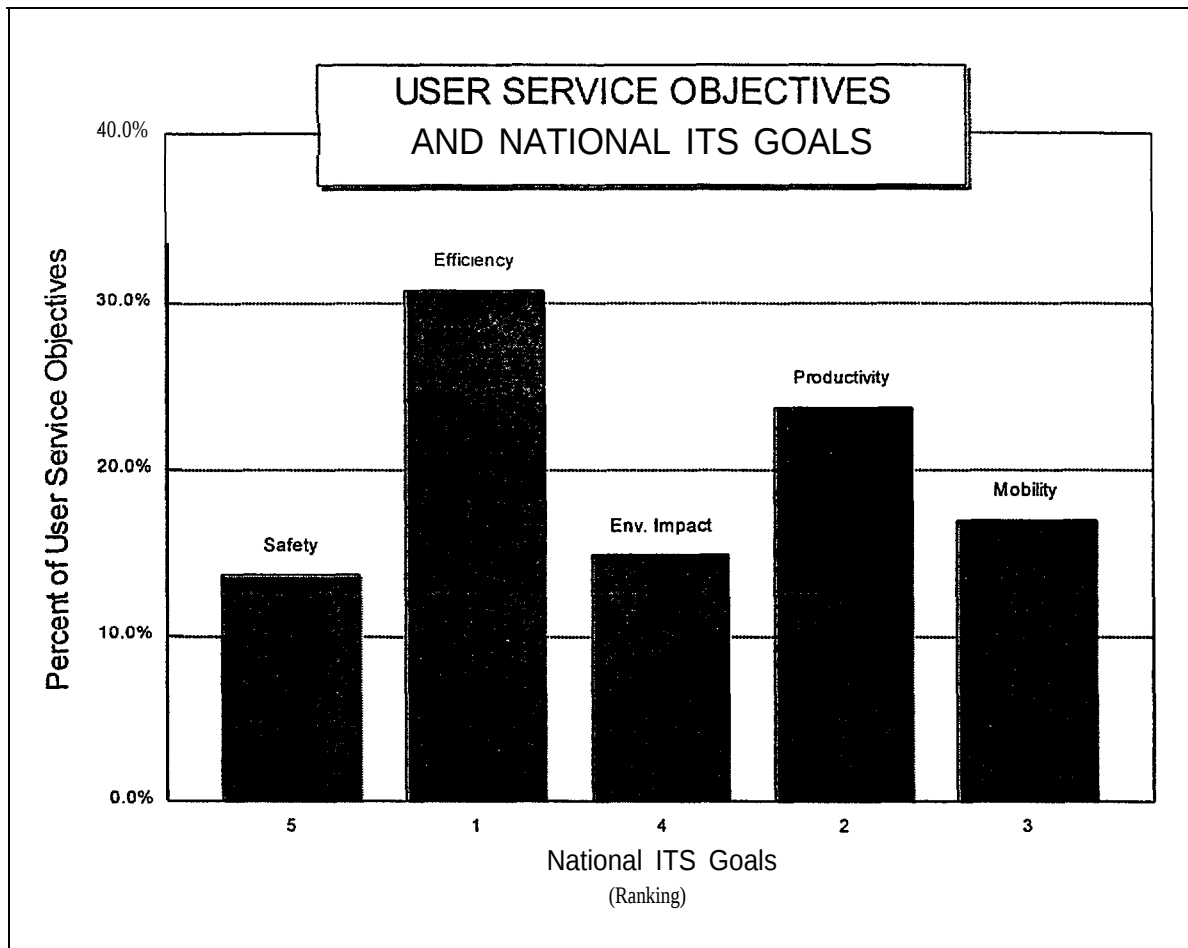
-  Efficiency
- Environmental Impact
- Productivity
- Mobility

where:

Safety	is defined as the objectives that relate to the reduction in the frequency of accidents and/or reducing the severity of the collision.
Efficiency	is defined as the improved service level which would result in ITS-related objectives due to an increase in capacity, a reduction in congestion due to incidents, and/or an improvement in transportation customer service.
Environmental Impact	is defined as ITS objectives which are expected to have a significant impact on energy consumption, a reduction of emissions, and/or reduced right-of-way requirements.
Productivity	is based upon expected reduced costs by operating agencies, a reduction in travel time, and/or an improvement in transportation system management and planning.
Mobility	is an impact relating to traveler security, a reduction in travel stress, and/or an improvement in the accessibility of the transportation system.

Many of the objectives identified could potentially satisfy one or more of these overall goals. The results of this comparison indicates a clear focus on improving the efficiency and the productivity of the transportation system. A graphical summary of the results follows in Figure 4.

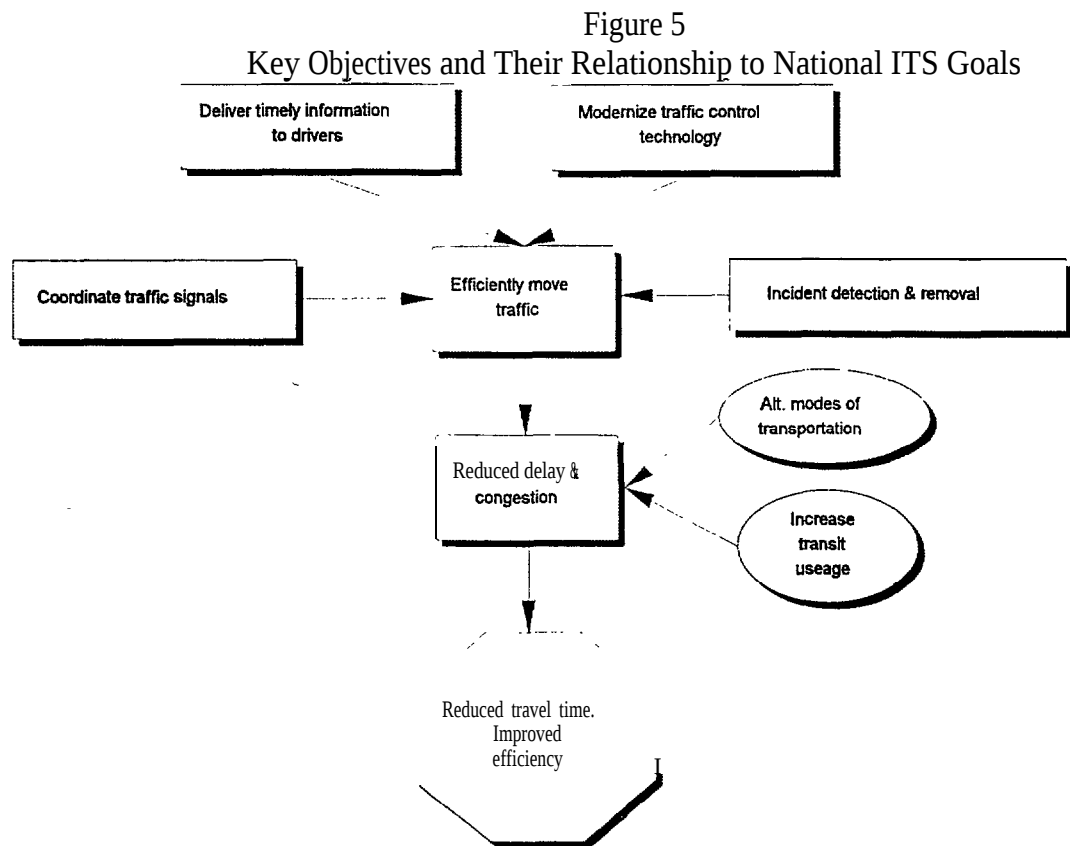
Figure 4



Further analysis of the coalition surveys, previous studies and focus group results indicate:

- Traffic management (efficient movement of traffic) objectives are a key concern that impact each of the five goals.
- Public transit issues are well represented and were emphasized by the majority of the surveys and focus group coalition members.
- Traffic signal coordination and operation improvements were heavily emphasized in the previous studies and were reinforced by coalition members.
- Overall, a general consensus was reached that the timely dissemination of traveler information is the key to improving efficiency.

Figure 5 presents a flowchart which summarizes the analysis results and illustrates the relationship between key objectives and the expected overall improvement in the transportation system.



Comparison of MAG Regional Goals to ITS Early Deployment Plan (EDP) Goals

The scope of work for Task 2 of the ITS Strategic Plan states “The identified goals and objectives should be linked to the MAG Regional Council vision and mission to ensure the ITS Strategic Plan goals and objectives are consistent with established regional transportation system goals and objectives.”

In order to determine the extent of such a link, a draft copy of the MAG Long-Range Transportation Plan (LRTP) Summary and Update was reviewed. The public participation process which has been conducted to date on the LRTP covers a broader array of topics than the EDP; however, the following similarities exist:

- There was wide support for transit improvements during LRTP public participation to date. Thus, the LRTP proposes doubling bus service and tripling Dial-A-Ride service. This high support for transit was echoed during the EDP focus group round tables.

- . Under the heading of “Demand and System Management” the draft LRTP indicates that the five year program includes funding for traffic signal and freeway management system improvements. Twelve million dollars in MAG CMAQ funds is expected to be allocated to improved signalization. These types of goals have also been stressed in the EDP. The EDP is summarized as part of the LRTP in this section of the draft report.

- . Transportation management systems included in the LRTP are listed as follows:
Congestion Management System (CMS)
Intermodal Management System (IMS)
Pavement Management System (PMS)
Safety Management System (SMS)
Bridge Management System (BMS)
Public Transportation Management System (PTMS)

Congestion management considerations addressed by the CMS and multimodal considerations included in the IMS and PTMS are key components to the successful deployment of ITS in the County.

- . Regional Dial-A-Ride and computerized ride matching was mentioned in the EDP roundtables. The MAG LRTP’s trip reduction program, van pool program and ridesharing programs can play a vital role in the success of ITS if technologies are implemented to automate these programs. Long range transit plans include a much broader based service area than what is expected in the short-term.