2. PROGRAM GOALS AND OBJECTIVES

2.1 Vision Statement

The US DOT has stated that "projects have the greatest chance for success when they promote a shared vision." A long-term view of services and needs to be addressed (and how ITS can improve the surface transportation network) underpins any vision for ITS deployments across the state of Illinois. At its simplest, an integrated network of surface transportation information is based on monitoring, information management, system control and optimization – in short, the creation of an integrated statewide network of transportation information shared between agencies and the traveling public. The information to be gathered and managed includes real-time information on the physical state of the infrastructure; how it is being built, used, maintained, and secured, relevant weather conditions, driver expectations and other information for system operators and users. At the highest level, the statewide vision for ITS in Illinois can be stated simply as …

Informed Choices for Improved Operations

Inherent in this vision is *the use of technology to provide safe, secure, and seamless services to the traveling public* within a flexible, adaptable, standards-based framework for the integration and coordination of transportation for both systems and operations. The transportation system should be managed and operated to provide seamless, end-to-end intermodal passenger travel, regardless of traveler age, disability, or location. The system should be equally supportive of efficient, seamless, end-to-end intermodal freight transport. Public policy and private sector decision makers must support the Statewide ITS Vision, so that future transportation will be secure, customer-oriented, performance-driven, responsive in times of crisis, and institutionally innovative - enabled by information that is derived from a fully integrated network of computing, communications, and sensor technologies. The Statewide ITS Vision is based on success in all of the following areas:

- Cost-Effectiveness
- Equitable Service
- Efficient System
- Information to User
- Low User Cost
- Minimum Travel Time
- No Surprise Delays
- Personal Security
- Positive Image
- Reliable Transportation
- Seamless Agency Coordination
- User Friendly
- Zero Accidents

2.2 Goals and Objectives

A byproduct of the Statewide ITS Vision is a set of goals and objectives that will allow continued introduction of ITS technologies into the institutional and funding framework of surface transportation in the State of Illinois. The statewide ITS goals and objectives will build on the framework set by current ITS pioneering efforts. These goals and objectives are:

Goals

- Deploy an electronic information infrastructure that works in concert with the physical infrastructure to maximize system *efficiency and utility*, and to encourage *modal integration and modal choice*.

- Deploy a *secure system* that can both detect and respond to regional crises maximizing the *efficient use of resources*.
- Improve the *transportation system's safety* by minimizing the occurrence of incidents, traffic deaths, and lowering response times.
- Disseminate information to system operators and users to help contain congestion and *increase the system's effective capacity*, while reducing the need for new construction.
- *Reduce energy consumption and negative environmental impact* through technology, information exchange, and operational practices.

Objectives

- Coordinate the planning and deployment of ITS technologies between agencies to *leverage funding and promote interoperability*.
- Provide a working tool for improved *planning, scheduling, and integration* between state and local agencies.
- Improve the *sharing and dissemination of information* between state and local agencies.

The goals and objectives of the transportation system cannot be fully articulated without considering who will use, maintain, and expand the system. The evolving needs of these stakeholders, documented in Section 3, must guide any alterations to the transportation network. They include:

- The motoring public
- Public safety responders
- Transit riders
- Rural residents
- Travelers / tourists
- Implementing agencies
- Funding agencies
- Commercial vehicle operators
- Maintenance and operations agencies
- Elected officials
- Intermodal planners / users
- All transportation modes

2.3 Overall Program Direction

In many ways, Illinois is the transportation center of America. Chicago has been the hub of the nation's rail system for nearly 150 years. Over 50 railroads currently traverse the state, providing links between all corners of the country. O'Hare International Airport and the major commuter hub at Midway Airport make Chicago one of the busiest air destinations in the world. More than 118 public-use airports, 273 heliports, and over 1,000 aviation facilities further emphasize the state's standing in aviation. Illinois also has over 1,100 miles of navigable waterways which link the Mississippi River (and the Gulf of Mexico) to the Great Lakes and beyond to the Atlantic Ocean. To augment these other forms of freight shipping, over 6,100 commercial trucking companies are based in Illinois. These trucking companies, as well as the over eight million registered drivers in Illinois, provide a significant demand on the state's 136,402 miles of roadways. This road system includes over 2,100 miles of interstate highways, the third highest total of any state in the nation, and an additional 35,000 miles of state roadways.[1] Adding further complexity to the picture of Illinois' transportation infrastructure is the fact that vast portions of the state are not densely populated. In point of fact, approximately 73 percent of the state's roadways are classified as rural.[2]

[1] Illinois Department of Commerce and Economic Opportunity
[2] National Association of Development Organizations

With this enormous transportation infrastructure comes a multitude of challenges, all of which revolve around the safety, mobility, and economic viability of the transportation system. Illinois has been a pioneer in the use of ITS to address these challenges. What we today call ITS began in Illinois in the Chicago area as early as 1963 when IDOT's Traffic Systems Center (TSC) established one of the first real-time expressway surveillance and management systems in the world. The detectors, ramp meters, variable message signs, and highway advisory radio (HAR) systems have been operated continuously ever since. Some of these technologies have since been deployed outside of the Chicago area, in: the Illinois portion of the St. Louis metropolitan area, Peoria-East Peoria, the Quad Cities, Rockford, Bloomington, and most recently in Springfield. ITS components have also been deployed in rural areas of the state for road weather information systems and rural transportation management.

The benefits provided by such systems have set an example for other ITS initiatives throughout the state, both in urban and rural settings. As a result, the State of Illinois and many of its municipalities have applied technology and management strategies to improve the safety, capacity, and efficiency of the transportation system.

Section 6.3 provides a summary of major ITS planning initiatives in Illinois at a statewide, regional, and local level. These projects focus on a wide range of transportation fields, including transit management, traveler information, electronic toll collection, traffic management, highway-rail intersections, commercial vehicle operations, incident/emergency response, and maintenance/construction management. Planning for many of these projects has been carried out at the local or regional level, and some have involved the participation of several transportation agencies. As described in the Statewide Concept of Operations and summarized later in Section 4 of this document, the IDOT ITS Program Office has provided the lead role for ITS planning and deployment in Illinois. This ITS Strategic Plan serves as a tool for the Program Office to plan statewide ITS initiatives with a wider, ten-year perspective. In addition, recommendations in Section 11, Program Management, include additional transportation stakeholders' participation in the planning, programming, funding, and deployment of ITS projects.

2.4 Performance Measures

Before deploying ITS, various measures of effectiveness (MOE) are defined to evaluate the performance of ITS components. These performance measures often quantify the effect that ITS elements have on the transportation system, rather than the operation of the components themselves. The FHWA ITS Joint Program Office (JPO) has defined the following goal areas for ITS: improve traveler safety, improve traveler mobility, improve system capacity/throughput, enhance customer satisfaction, increase the productivity of transportation providers, and conserve energy while protecting the environment. The following subsections outline these goal areas and their associated measures of effectiveness. These measures will provide the basis for evaluating the performance of ITS components in the state of Illinois.

2.4.1 SAFETY

A specific goal of ITS components in Illinois is to improve transportation system safety by minimizing the occurrence of incidents, traffic deaths, and lowering incident response times. Several ITS components aim to minimize the occurrence of crashes, speed the detection of incidents that do occur, and help to clear crashes more quickly. Typical measures of effectiveness used to quantify safety improvements include reductions in the overall crash rate, fatality crash rate, and injury crash rate (per miles traveled). To ensure that "before and after" comparisons of the safety impacts of ITS deployments are accurate, surrogate measures can be applied. These surrogate measures used include vehicle speeds (in relation to the posted limits), speed variability, or changes in the number of violations of traffic safety laws.

2.4.2 MOBILITY

A major goal of many ITS projects is the improvement of mobility by reducing delay and travel times. Measures of effectiveness typically used to evaluate mobility improvements include reduction in travel time delay, reduction in travel time variability, and improvement in surrogate measures like the number of stops observed before and after an ITS deployment.

Delay is measured in different ways depending on the transportation mode being analyzed. Delay of a system is typically measured in seconds or minutes of delay per vehicle. In addition, delay for users of the system may be measured in person-hours. Delay for freight shipments could be measured in time past scheduled arrival time of the shipment. Delay can also be measured by observing the number of stops experienced by drivers before and after a project is deployed or implemented.

Travel time variability is defined as “the variability in overall travel time from an origin to a destination in the system, including any modal transfers or en-route stops.”[3] This measure of effectiveness can be applied to the movement of goods or people. Reducing the variability of travel time improves the reliability of arrival time estimates that travelers or companies use to make planning and scheduling decisions. By improving operations, improving incident response, and providing information on delays, ITS components can reduce the variability of travel time in transportation networks.

2.4.3 CAPACITY/THROUGHPUT

Many ITS components seek to optimize the efficiency of the existing transportation system. This allows mobility and commerce needs to be met while reducing the need to construct or expand facilities. This is accomplished by increasing the effective capacity of the transportation system. Effective capacity is defined as the "maximum potential rate at which persons or vehicles may traverse a link, node, or network under a representative composite of roadway conditions," including "weather, incidents, and variation in traffic demand patterns."[4] Capacity, as defined by the *Highway Capacity Manual*, is the "maximum hourly rate at which persons or vehicles can reasonably be expected to traverse a given point or uniform section of a lane or roadway during a given time period under prevailing roadway, traffic, and control conditions." While capacity is generally measured under typical conditions, i.e., good weather and pavement conditions with no incidents affecting the system, effective capacity can vary depending upon these conditions and the use of management and operational strategies. Throughput is defined as “the number of persons, goods, or vehicles traversing a roadway section or network per unit time.”[5] Increases in throughput are sometimes realizations of increases in effective capacity. Under certain conditions, it may reflect the maximum number of travelers that can be accommodated by a transportation system. Throughput is more easily measured than effective capacity and therefore can be used as a surrogate measure when analyzing the performance of an ITS project.

2.4.4 CUSTOMER SATISFACTION

Given that many ITS projects and programs were specifically developed to serve the public, it is important to ensure that traveler expectations are being met or surpassed. Customer satisfaction measures characterize the difference between users' expectations and experiences in relation to a service or product. The central question in a customer satisfaction evaluation is, "Does the product deliver sufficient value (or benefits) in exchange for the customer's investment, whether the investment is measured in money or time?"[6] Typical results reported in evaluating the impacts of customer satisfaction with a product or service include product awareness, expectations of product benefit(s), product use, response (decision-

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[3] USDOT, ITS Evaluation Guidelines – ITS Evaluation Resource Guide
[4] USDOT, ITS Evaluation Guidelines – ITS Evaluation Resource Guide
[5] USDOT, ITS Evaluation Guidelines – ITS Evaluation Resource Guide
[6] USDOT, ITS Evaluation Guidelines – ITS Evaluation Resource Guide

making or behavior change), realization of benefits, and assessment of value. Although satisfaction is difficult to measure directly, especially for some ITS projects, measures related to satisfaction can be observed, including on-time arrival rate, amount of travel in various modes, mode choices, and the volume of complaints and/or compliments received by the service provider.

In addition to user or customer satisfaction, it is necessary to evaluate the satisfaction of the transportation system provider or manager. For example, many ITS projects are implemented to better coordinate between various stakeholders in the transportation arena. In such projects, it is important to measure the satisfaction of the transportation provider to ensure the best use of limited funding. One way to measure the performance of such a project is to survey transportation providers before and after a project has been implemented to see if coordination was improved. It may also be possible to bring together providers from each of the stakeholder groups to evaluate their satisfaction with the system before and after the implementation of an ITS project.

2.4.5 PRODUCTIVITY

ITS implementations can reduce operating costs and provide productivity improvements. Some applications may save time in completing business or regulatory processes, enabling businesses to increase their economic efficiency. For public agencies in Illinois, ITS alternatives for transportation improvements may have lower acquisition costs and life cycle costs when compared to traditional transportation improvements. Other ITS applications enable the collection and synthesis of data that can translate into cost savings and performance improvements. Operational efficiencies and cost savings made possible by ITS implementation can help both public and private entities make the most productive use of their resources. The measure of effectiveness for this goal area is cost savings as a result of implementing ITS.

2.4.6 ENERGY AND ENVIRONMENT

The air quality and energy impacts of ITS components are very important considerations, particularly for non-attainment areas. In most cases, environmental benefits of a given ITS project are hard to quantify and can only be estimated by the use of analysis and simulation. Problems related to regional measurement include the small impact of individual projects and large numbers of exogenous variables including weather, contributions from non-mobile sources, air pollution drifting into an area from other regions, as well as the time-evolving nature of ozone pollution. Small-scale environmental studies generally show that ITS projects have positive impacts on the environment, which result from smoother and more efficient traffic flow that ITS can help bring about. However, environmental impacts of travelers reacting to large-scale ITS deployment in the long term are not well understood.

Identified measures of effectiveness for this goal area are decreases in emission levels and energy consumption. Specific measures of effectiveness for emission levels and fuel use include:

- Emission levels (kilograms or tons of pollutants including carbon monoxide (CO), oxides of nitrogen (NOx), hydrocarbons (HC), and volatile organic compounds)
- Fuel use (gallons)
- Fuel economy (miles/gal)