CAMBRIDGE SYSTEMATICS

Economic Analysis Readiness Assessment

Task 4 - Final Report

final

report

prepared for

Idaho Transportation Department

prepared by

Cambridge Systematics, Inc.

June 22, 2012

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555 12th Street, Suite 1600
Oakland, CA 94607

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Executive Summary

In April through June, 2012, Idaho Transportation Department (ITD) contracted Cambridge Systematics (CS) to assess the Department's readiness to initiate economic analysis as part of its planning activities. This report summarizes the results of two workshops and a series of information gathering interviews with ITD staff conducted at ITD headquarters in Boise, Idaho in May 2012, highlighting separately the perspectives of ITD executive and technical staff. This report complements the *Economic Analysis Readiness Assessment White Paper: Task 1 – Synthesis of State DOT Approaches to Economic Analysis*.

ITD is faced with two main drivers to pursue economic analysis:

- **Project 60 Initiative,** Governor C.L. "Butch" Otter's plan to grow Idaho's gross state product from $51.5 billion to $60 billion by selling more of Idaho's products and services to the world; and
- **ITD's Strategic Planning Goals**, ITD regards economic analysis as one of several methods to help it contend with diminishing funding for its operations, preservation and capital expansion.

TECHNICAL AND INSTITUTIONAL READINESS

Fortunately, ITD has been collecting much of the data needed to launch economic analysis. These data include existing traffic counts, socioeconomic data from the six different districts using state and national resources, a nascent geospatial database, and asset management information.

ITD, however, does not have the commodity flow data or forecasts that would be needed for many likely applications of economic analysis. In addition, it is also missing a statewide travel demand model (TDM), which would show the direct benefits generated by the alternative investments or planning scenarios.

At the same time that CS has conducted this Economic Analysis Readiness Assessment, CS has also conducted an assessment of ITD readiness to develop and apply a statewide TDM. A statewide TDM would fill the gaps in these missing data sets and provide analytical inputs needed to conduct economic analysis.

ITD has recently procured TREDIS, which is the analytical tool with which to conduct economic analysis. TREDIS is web-based software for assessing economic impacts of transportation projects. TREDIS is capable of performing a wide variety of economic analyses, but it will need the data and forecasts from a TDM.

In addition to the data and forecasts described above, ITD will need to train one or more of its existing staff or recruit new personnel who can apply TREDIS and conduct economic analysis, interpret results, and present these to stakeholders. Many ITD personnel already possess the necessary skills for conducting economic analysis. In fact, the list of staff interviewed for the information gathering session maintained a positive outlook on the changes anticipated for performance-based planning.

At the executive level, the efforts of Paul Steinman have strongly signaled an interest for ITD to support the Governor's goals through Project 60 and a need to understand the state-of-the-art practice for economic analysis. Potential barriers for moving forward include the inertia toward a conventional planning culture. The current executive team will have to support the initiatives for economic analysis and performance-based planning at all levels within the organization.

FRAMEWORK FOR ECONOMIC ANALYSIS

ITD could apply economic analysis at each of the following five levels of planning activity. These levels of planning activity are typical of most if not all state departments of transportation (DOTs). They are described below and we provide an example of how ITD would apply economic analysis at each of these levels:

1. Determine Optimal Level of Overall Transportation Investment;

   An economic analysis could evaluate how an increase in the state's gas tax would change future output (gross state product), employment, wages, or personal income. If the economy grew more with the gas tax, ITD could claim that the investments funded with the additional gas taxes stimulated more growth among the state's businesses than the spending of the same amount of money by private citizens.

2. Allocation of DOT Funding Across Programs;

   ITD could evaluate the allocation between alternative transportation programs to reduce injuries or improve travel speeds. Given these objectives are almost contradictory, this analysis could identify the overlap between those segments of the state highway network with the highest accident rates and the most economically vital segments of roadway.

3. Project Prioritization;

   ITD would like to rank preservation projects statewide: At present, each district determines its priorities for preservation of state highways and bridges within their district given allocations from headquarters mostly independent of the future (forecasted) travel volumes. Economic analysis would rank preservation projects statewide based on the relative significance of each roadway's contribution to job retention and creation or based on the output (GSP) of businesses served by the roadway segments.

4. Compare Alternative Investments within a Corridor; and

   ITD conducts corridor plans where it evaluates the alternative investments. These corridor-specific planning efforts often focus on alternative alignments. An economic analysis would compare the future benefits each alternative would generate in terms of new employment, business attraction and retention, changes in output (GSP), personal income, and other economic metrics.

5. Specialized Activities.

   ITD could conduct economic analysis on TIGER grants, port of entry (POE) improvements, new or changes to existing transportation funding sources, targeted economic development initiatives, and value capture policies. This latter example involves applying economic analysis to an ITD initiative to develop a statewide value capture policy.

In most of these planning activities, the data and tools needed to perform economic analysis are the same. What may impede the analysis, however, are the trained staff (i.e., human resources) needed to conduct or entrenched institutional mindset that will interfere with integrating economic analysis into that level of planning. The next subsection describes these institutional barriers.

INSTITUTIONAL BARRIERS TO OVERCOME

Our readiness assessment identified some institutional barriers which ITD will need to overcome before it can apply economic analysis at each of the five levels of planning activity within ITD. These include the following:

- ITD does not have an overall set of clear, concise goals for its planning and programming activities and this deficiency makes it difficult to define specific objectives for application of economic analysis. Although the Governor's Project 60 states its goal is to increase the state's gross state product (GSP) from $51 billion to $60 billion, it does not specify the share of this that would be expected from ITD's investments. The proposed development of a department-wide performance-based planning approach would remedy this impediment;
- The recent reorganization of ITD management may have clarified who within the senior management will be responsible for conducting economic analysis and who will present results to stakeholders. Nevertheless, we were not certain if these assignments were clear to the designated ITD staff and if other functions within ITD are clear who owns the implementation of economic analysis;
- This readiness study and its parallel study to determine the need for a travel demand model will provide cost estimates to acquire missing data and analytical tools. Once these needs and costs are clear, ITD will need to develop a funding plan and implementation timeframe; and

- While many of ITD headquarters staff are aware of the possible applications of economic analysis and the consequences of this on program and project prioritization, staff in the ITD districts appear less informed but are likely to be impacted if economic analysis is applied to their planning activities. In addition, stakeholder groups and other state government departments are also not aware of how economic analysis could impact their expectations for ITD's support. While there is ample time before the implementation of economic analysis has direct consequences for any of these internal or external stakeholders, ITD should plan to develop a communications and public relations campaign.

RECOMMENDATIONS FOR ACTION

The following are recommendations and next steps for integrating economics into ITD's decision-making.

- **Establish an Engaged Project Team.** To build success and create champions for economic analysis within ITD, it would be important to assemble an internal team to guide the day-to-day progress and focus on the challenges of eventual implementation throughout ITD. Starting with Paul Steinman, the Chief Operating Officer as the lead champion, a committee of ITD management staff and a small technical support staff should be identified to guide the process;
- **Develop an Overall Framework for Performance-Based Planning.** The interviews and workshops affirmed ITD's desire to place economic analysis within a larger framework of performance-based planning. At its core, performance-based planning establishes clear goals, quantitative targets for each goal, and specific metrics that measure progress toward attainment of these targets. The ultimate purpose of performance-based planning is to help decision makers stay focused on long-term goals and make hard choices. CS recommends ITD implement performance-based planning in parallel to its development and application of economic analysis; and
- **Develop a Statewide Travel Demand Model.** We recommend development of a statewide TDM, including the acquisition of a commodity flow database. CS has prepared detailed assessment of ITD readiness to develop a statewide TDM under a separate cover. This effort includes specific recommendations for acquiring the necessary data and human resources.

1.0 Introduction

1.1 BACKGROUND AND PURPOSE

This Economic Analysis Readiness Final Report summarizes our assessment of Idaho Transportation Department's (ITD) readiness to apply economic analysis as a tool for evaluating its investment choices and planning activities.

The origins for the ITD's interest in economic analysis go back more than ten years when the Department first contracted with Cambridge Systematics to present to Departmental Executive Management the results of their work in Montana. Over the years the Department either used input-output based economic models for economic analysis (e.g. for the analysis of GARVEE Bonding Legislation and Stimulus Funding) or contracted with consultants for economic impact analysis (e.g. for TIGER grants).

Project 60 Initiative Awakens a Need for Economic Analysis

The need to apply economic analysis, however, took on new urgency with Governor C.L. "Butch" Otter's vision to strengthen and diversify the state's economy through his Project 60 Initiative. Project 60 is Governor Otter's plan to grow Idaho's gross state product (GSP) from $51.5 billion to $60 billion by selling more of Idaho's products and services to the world and showcase Idaho's stable and predictable tax and regulatory environment. Idaho's GSP and the state's transportation system are intrinsically linked. People and businesses depend on a network that provides safe, reliable, fast and efficient service. ITD plans to measure the following objectives within the agency's planning processes:

- Increase in the efficiency in which goods are transported;
- Increase in Idaho's GSP;
- Increase in jobs and business revenues; and
- Reduction in travel times for community, commerce, recreation and tourism.

The measurement of these objectives all require either an economic model and a travel demand model (TDM), which is a necessary precursor to conducting economic analysis.

The Potential for Economic Analysis to Support ITD's Goals

In addition to the Project 60 mandate, ITD regards economic analysis as one of several methods to help it allocate diminishing funding for its operations, preservation and capital expansion because of three adverse trends:

- Federal and state gas tax rates have been flat or declining since 1996 compared to the costs of construction and operations, which have been rising much faster than inflation;
- Federal reauthorization for transportation has been stalled and the proposed MAP-21 legislation will likely maintain or cut current levels; and,
- Average asset age of Idaho's transportation infrastructure is reaching its threshold for major maintenance and reconstruction.

These trends are likely to exacerbate the present funding scarcity in the coming years with no obvious immediate relief.

Given Project 60's immediate mandate and ITD's desire to use economic analysis to help it allocate scarce resources, ITD requested Cambridge Systematics (CS) assess the Department's readiness to initiate economic analysis as part of its planning activities. This study, performed during April through June 2012, charts a way forward for ITD to evaluate its investment choices and planning activities.

1.2 FORMAT FOR INFORMATION GATHERING

This study summarizes the results of extensive national research (summarized in the Task 1 White Paper), two workshops with executive and technical staff in ITD, and two days of interviews with ITD staff and some outside stakeholders conducted at ITD headquarters in May 2012. These workshops and interviews gathered information on the readiness of ITD's executive management and its technical staff to apply economic analysis at each levels of planning activity. Agendas for both of the workshops and summaries of the interviews are provided in Appendix A.

The CS consultant team engaged the ITD staff in two workshops covering the use, methodologies, benefits, and issues regarding economic impact analysis for transportation, and to explore the types of projects and decision making needs for which ITD may use economic analysis. The first workshop was oriented toward policy makers and executive staff, while the second workshop was oriented toward targeted agency management and staff at ITD and its partners. The workshops included PowerPoint presentations on economic impact analysis more broadly (project and program level, by mode, models, performance measures) and specifically related to TREDIS.[1] The presentations for both workshops are provided in Appendix B.

[1] TREDIS is web-based software solution for assessing economic impacts, benefits, and costs of transportation projects. The tool was developed and maintained by Economic Development Research Group in Boston MA. ITD purchased an annual license for TREDIS in 2012.

CS also facilitated informal information gathering sessions with ITD headquarters and district staff to assess ITD's readiness to conduct economic analysis and integrate the results in decision making processes. Our interview gathered information of available and missing data and procedures conducted in current ITD plans and programs. Based on the findings of the White Paper conducted in Task 1, ITD's practices were compared to ones followed by other transportation agencies that use economic analysis in their decision making processes.

To assess ITD's economic analysis readiness, CS used the workshops and the interviews to evaluate the basic data, analytical tools and human resources needed to conduct economic analysis across all planning activities that ITD engages in. Where we found that ITD does not have the technical and institutional structure to conduct economic analysis, we suggest the most cost-effective methods to obtain these missing resources.

1.3 REPORT OUTLINE

This report summarizes the results of the workshops and information gathering interviews from the Economic Analysis Readiness Assessment. This reports complements the *Economic Analysis Readiness Assessment White Paper: Task 1 – Synthesis of State DOT Approaches to Economic Analysis*. The document is provided as Appendix C.

This report is organized as follows:

Section 2.0, Overall Technical and Institutional Readiness outlines the basic data, analytical tools and human resources needed to conduct economic analysis across all planning activities that ITD engages in. It also lists the current data gaps in data, analytical tools, and human resources and suggests cost-effective methods to obtain these missing resources when ITD does not possess them.

Section 3.0, Suggested Framework for Economic Analysis at Each Level of Planning Activity divides the Department's planning activities into five levels typical of most if not all state departments of transportation (DOTs) and provides an example of how ITD would apply economic analysis in each level identified in the overall assessment.

- **Section, 4.0, A Way Forward: Next Steps** provides summary observations from the assessment and identifies the next steps for integrating economic analysis into ITD's decision-making.

2.0 Overall Technical and Institutional Readiness

This section describes what is needed to conduct economic analysis at any level of planning activity, and assesses the current internal capabilities within the organization. It identifies constraints and impediments to implementation, which includes ITD's willingness to apply the results of economic analysis in the most effective manner. The readiness elements are divided into three subsections: data, analytical tools and human resources.

2.1 DATA

Fortunately, ITD has been collecting much of the data needed to launch performance-based planning. An initial step in developing inputs for conducting an economic analysis at any scale is to represent the travel demand characteristics for transportation in Idaho.

This requires ITD to define the highway network, including travel times, travel distances, accident rates, origin-destination patterns, reliability/delay, volumes of cars and trucks (i.e., a trip table) between zones within Idaho (most likely counties) and to/from other areas of the U.S. and abroad. The truck and rail flows should reflect volumes of freight, broken down by major industry or commodity. These passenger and freight flows operate within an existing land use pattern that generates and attracts demand for transportation; thus the underlying socioeconomic data that drives the traffic. Finally, ITD will also need a geospatial data repository and an asset management database in order to understand the location, performance, and condition of the existing assets.

The categories listed below summarize information currently available at ITD for conducting economic analysis.

Traffic Counts and Traffic Data

ITD maintains TRADAS, a data warehousing software system for collecting, editing, summarizing, and reporting a wide range of traffic data and is an automated system for managing their travel monitoring program data. The entire Idaho state highway system has over 230 permanent automated traffic recorders (ATRs). ATR systems use several different types of sensors and system electronics to record vehicle volume, length, speed, and some classification data.

In the Boise area, there are also 10 Bluetooth detectors to collect Bluetooth pairings on segments in addition to the 230 statewide ATR to collect speed

information. There is no data or ability to divine the origin and destinations of vehicles on the roadway.

There are up to 25 Weigh-in-Motion (WIM) detectors on the state highways system. These are permanent roadside systems which collect axle weight data as well as vehicle volume, length, speed and classification data.

All traffic counts are for the purpose of generating monthly or annual reports on past data. This provides a reliable record of past traffic flows. When there is a need to project forward for future projections, ITD analysts apply a straight line growth trajectory using the historical data. This simple approach to forecasting is not sensitive to the future trends in land use that most likely vary from past trends.

Commodity Flows and Commodity Forecasts

In late 2011, ITD initiated a Freight Study and Rail Plan which involves a study of the statewide multimodal freight network to address current and future transportation needs. The purpose is to analyze the movement of freight into, out of, and through Idaho regardless of mode. This effort allows the various planning partners to look at all freight movement, whether it is on rail lines, the highway system, through ports, or by air and to identify how to improve the linkages between all systems. Through this process, the following data will be collected, all of which are also useful for conducting economic analysis (and developing a statewide TDM:

- Rail waybill data for origin and destination of shipments;
- County-level commodity flows for all industries and multiple modes;
- Railroad infrastructure information including track condition, type train control system, number of tracks and speed and weight limits;
- Roadway infrastructure including condition, number of lanes, speed and load limits; and
- Vehicle counts for all modes.

As part of the Freight Study and Rail Plan, ITD and its consultant team (led by Cambridge Systematics) will query the Freight Analysis Framework (FAF3) to view current and forecast commodity flows for truck, rail, maritime and air freight. ITD will present the data in graphical form to illustrate directional flows (inbound, outbound, intra- and through trips), top commodities by mode, and key trading partners by mode. All FAF3 data will be presented for today (2010) and the future (2040) in both tons and dollars.

One key drawback with using the FAF3 data (which uses data from the 2007 Commodity Flow Survey) is that the level of aggregation is very coarse; namely, Idaho is represented by a single zone and there is no information about shipment distances within different subregions. This limits the type of analyses that can be conducted without additional processing. In fact, specially collected freight data

would be required to construct a travel model capable of forecasting future intra-Idaho and interstate freight shipments.

Socioeconomic Data and Land Use Forecasts

ITD currently uses population and employment information from the U.S. Census (2010). Idaho Department of Labor's Labor Market Information (LMI) and the Idaho Department of Commerce both have resources to process population demographics, change and growth patterns, and socioeconomic information on people, housing, the economy, education and social indicators, land ownership, natural resources, and agriculture at the county level.

Land use data are maintained at the metropolitan planning organizations (MPOs). ITD has six metropolitan partners:

- Kootenai Metropolitan Planning Organization (KMPO) consisting of all the communities in Kootenai County;
- Lewis-Clark Valley Metropolitan Planning Organization (LCVMPO) consisting of the cities of Lewiston and Clarkston;
- Community Planning Association of Southwest Idaho (COMPASS) – Northern Ada County Metropolitan Planning Area consisting of the cities of Boise, Garden City, Eagle, Meridian, Kuna, and Star;
- Nampa Metropolitan Planning Area consisting of the cities of Nampa, Caldwell and Middleton;
- Bannock Transportation Planning Organization (BPO) consisting of the cities of Pocatello and Chubbuck and the urbanized area of Bannock County; and
- Bonneville Metropolitan Planning Organization (BMPO) consisting of the cities of Idaho Falls, Ammon and Iona and the urbanized area of Bonneville County.

iPlan Geospatial Information

ITD has embarked on a statewide program to make data used in planning for the state's roadway system available on the web. The system, which has been referred to as iPlan, would incorporate much of the data that has been assembled for corridor planning by ITD's districts in a way that would allow a user to assemble the most current data for a corridor and produce the graphics and tables needed for a new or refreshed plan. iPlan is a planning tool currently being developed that will enable staff to examine layers of data from a number of locations in a Geographic Information System environment. That would enhance the planning process by providing critical data. It will be a tool for scenario building that layers system performance measures, long-term system vision and financial forecasts.

Parallel efforts at the district level are already beginning to develop layers for iPlan. For instance, for District 6 has undertaken an innovative pilot program for

safety analysis and planning on its rural corridors. The pilot program includes the application of a new method for evaluation and prioritization of safety improvements and has been applied in a corridor-planning context. The method is based on existing and forecasted traffic volumes, roadway and intersection characteristics and traffic control, points of access, and planned safety or capacity improvements in the corridor. The pilot program has been applied to segments of the District 6 state highway system that have been rated "worse than average" for safety by using the district's "Corridor Health" assessment scoring system. All of the data and calculations used in this project have been retained in a GIS format that will allow them to be easily loaded in iPlan when the system is fully operational. The information has already been loaded into a prototype of iPlan assembled just for District 6.

Asset Management Information

In 2009, ITD purchased and began implementation of a new pavement management and maintenance management system, abbreviated as "TAMS" (Transportation Asset Management System). This new system allows all asset management related data to be stored in a centralized location. The Pavement Management System portion of TAMS has offered ITD a valuable chance to refine the way they calculate and analyze data, by implementing new pavement performance curves, decision trees that mimic district design choices, and performance models that accurately track and display pavement projects meant to help Idaho become an efficient Best-First practitioner of pavement management. This system can help answer questions such as the following:

- If $20 million is added to ITD's budget, how much better with the pavement deficiency be?
- How much money should be spent to get to a deficiency of 15 percent?
- How much should be spent in each program category?

When TAMS is linked to an economic analysis engine, the questions answered can be more far-reaching, including impacts on the greater economy of Idaho.

2.2 ANALYTICAL TOOLS

Many states are able to patch together existing internal models to generate estimates of direct user and nonuser benefits for economic analysis, but some use more sophisticated statewide travel models, which also may assign commodity flows to their roadway networks. Economic analysis then takes these direct measures of performance and feed them into input-output based economic analysis tools.

ITD has already acquired some of the analytical tools needed to launch economic analysis, which are described below.

Travel Demand Model (TDM)

One of the primary objectives of travel demand modeling is to provide decision makers with information for building new roads and transit facilities (supply) that best serve future travel demand given financial constraints while minimizing wasted capacity and environmental impacts and maximizing economic development, safety, and equity. Problems addressed can range from broad priorities statewide to specific programs and projects at a corridor or local level. Statewide TDMs are used for interregional corridor studies and other project analyses that have impacts beyond the boundaries of a single region or urban area. Statewide models can also provide useful inputs to urban and regional models including information on travel to, from, and through the individual regions.

ITD has expressed interest in developing a statewide TDM in conjunction with the economic analysis and performance-based planning efforts. ITD's most recent effort to develop a statewide TDM was in 2001. Idaho-specific trip generation rates and friction factors were developed by the National Institute for Advanced Transportation Technology at University of Idaho, using the household data collected from the statewide *1999 to 2000 Idaho Resident and Nonresident Motor Vehicle Travel Survey*.

That effort, however, did not succeed and ITD currently uses historically-based trend models to forecast 20-year, design-hour volumes for the design and analysis of proposed roadway projects. Nevertheless, much of the roadway network was archived and could be of use if ITD elects to develop a TDM.

In the urban areas of Idaho, MPOs use calibrated four-step models to estimate travel within the regions. Land use, economic and demographic data, and the geometry of the network are just some of the parameters that are incorporated into these metropolitan planning models. The planning for a statewide model should consider transportation planning models that have been developed by the MPOs in the state.

One but not the only application of an Idaho statewide model would be to provide input data for economic analysis (described below). If ITD develops a statewide TDM, its application to economic analysis will require some attention to specific functionality. Economic analysis, for example, requires dividing travel into at least three trip purposes; on-the-clock, commute (home-based work), and recreational/social. Ideally, we would recommend further dividing on-the-clock travel into commodity type and separating tourism from in-state social travel by Idaho residents.

Economic Model (TREDIS)

Transportation projects produce economic development when they induce permanent increases in employment, wages, and/or business output. Most robust economic analysis involves using one of a few economic modeling

software packages. ITD recently procured TREDIS, a web-based software package for assessing economic impacts, benefits, and costs of transportation projects. TREDIS is capable of performing a wide variety of economic analyses, but it will need the data and forecasts described in Subsection 2.1 above. In addition, TREDIS will benefit from a consistent cost estimation methodology applied to all projects and programs it evaluates, described below. A summary of TREDIS functionality and application is provided on its website (http://tredis.com/) and was evaluated and selected by ITD staff as part of a joint procurement with COMPASS earlier this year.

In addition to the data and forecasts described above, ITD will need to train one or more of its existing staff or recruit new personnel who can apply TREDIS and conduct economic analysis, interpret results, and present these to stakeholders. The current economist on staff is retiring within the month, which leaves both a challenge and an opportunity for filling his role in economic analysis. The opportunities include training existing staff to use the TREDIS software, work with counterparts at COMPASS who are using TREDIS, consult with TREDIS staff who provide technical support, hire consultants on a as-needed basis, and/or recruit new ITD staff to apply TREDIS.

Cost Estimation Model (Optional)

Many states have a cost estimation model, often as simple as an Excel spreadsheet to assist planning staff in comparing approximate probable costs to construct various project alternatives. The cost estimation model may or may not include a cost analysis over a 30-year default time period based on inputs for construction dates and unit operation and maintenance costs.

ITD does maintain a detailed project scheduling system, including Microsoft Project schedules with each transportation construction project linked to key milestones and tracked throughout its lifetime. Through ITD accountability reporting report, several key indicators are also tracked including:

- **Percent of Highways Projects Developed on Time.** The measure is determined by monitoring projects that are scheduled to be completed (ready for bid) and determining if these projects are completed by that date.
- **Construction Cost at Award as a Percent of Construction Budget.** This is measured by totaling the construction costs of projects obligated in the fiscal year and comparing them to the total construction budget programmed at the beginning of the fiscal year for the same projects.

This can be a very useful model to maintain consistency for cost information managed at ITD headquarters. If initiating economic analysis tied with for project level analysis or project prioritization, having a central repository with consistently maintained information will be necessary.

2.3 HUMAN RESOURCES AND INSTITUTIONAL PRACTICES

Human Resources

Many ITD personnel already possess the necessary skills for conducting economic analysis. In fact, the list of staff interviewed for the information gathering session maintained a positive outlook on the changes anticipated for performance-based planning. Even at the district level, the District Engineers interviewed (District 1, 3 and 6) all were very eager to move toward better data at the district level and moving beyond the "rear-view mirror" approach to better projections on future growth based on economic analysis and the accompanying statewide model.

At the executive level, the efforts of Paul Steinman have strongly signaled an interest for ITD to support the Governor's goals through Project 60 and a need to understand the state-of-the-art practice for economic analysis. There is a strong shift to measure successes through performance metrics and to begin educating staff on transportation's role in economic opportunity. The high percentage participation at both the executive and staff level workshops, including most of the senior ITD executive staff, as well as Director Brian Ness and Transportation Board Chair Jerry Whitehead proved the importance economic analysis will have for this administration.

Despite the high-level importance aimed at this issue, the staff level understanding of economic analysis and performance-based planning is still nascent. In many of the information gathering sessions, many questions were raised on how the shift would affect the day-to-day operations of staff work plans, and an acknowledgement that the changes would trickle down, but uncertainty in what form.

Longer–term, the impending retirement of a significant cohort of ITD's staff present an opportunity to recruit new staff with the necessary skill set and sensitivity to performance-based planning culture.

Institutional Practices

ITD conducts its planning like most if not all state DOTs, where project selection and programming priorities are determined through a combination of top-down and bottom-up processes. The bottom-up involves each district ranking its list of projects based on a set of engineering criteria. These criteria vary a bit by district but none are very sensitive to the differences in demand for each segment of roadway or specific bridge. Rather, project ranking is largely based on the relative condition of each facility regardless of its significance in the state's overall economy or accessibility. From the top-down, state legislators and the governor's office view transportation through a funding lens, where the political climate precludes raising taxes or imposing new fees to fund transportation and

there is a growing competition between the state's services for a larger slice of a shrinking pie of state revenues. Given this growing insufficiency of state funding, ITD needs a planning doctrine that will help it make tough choices.

3.0 Suggested Framework for Economic Analysis at Each Level of Planning Activity

In the following five subsections, we divide the Department's planning activities into the following five levels that are typical of most if not all state departments of transportation (DOTs):

1. Determine Optimal Level of Overall Transportation Investment;
2. Allocation of DOT Funding Across Programs;
3. Project Prioritization;
4. Compare Alternative Investments within a Corridor; and
5. Specialized Activities.

For each level of planning, we provide an example of how ITD would apply economic analysis and determine if the Department needs to acquire any data or analytical tools in addition to the data and tools we identified in the overall assessment. In most of the planning activities, however, the data and tools needed are the same. What is usually lacking are the human resources or conventional planning methods that will interfere with integrating economic analysis into that level of planning.

3.1 Determine Optimal Level of Overall Investment

An economic analysis could evaluate how an increase in the state's gas tax would change future output (gross state product), employment, wages, or personal income. This analysis would need to specify the investments the additional gas tax revenues would fund. The results would measure the difference between a scenario that included an increase in gas tax to one without in some future year. If the economy grew more with the gas tax, ITD could claim that the investments funded with the additional gas taxes stimulated more growth among the state's businesses then the spending of the same amount of money by private citizens. Such a finding would provide compelling evidence that Idaho has underinvested in its transportation infrastructure.

3.2 ALLOCATION OF DOT FUNDING ACROSS PROGRAMS

ITD must allocate limited resources across its districts and programs. An economic analysis could compare a program to fund more direct and faster travel for the targeted industries in the state's industry cluster analysis to a business-as-usual (BAU) scenario.

ITD would evaluate the allocation between alternative transportation programs to reduce injuries or improve travel speeds. Given these objectives are almost contradictory, this analysis could identify the overlap between those segments of the state highway network with the highest accident rates and the most economically vital segments of roadway. Many studies have been conducted to test the benefits of lower speed limits on safety, green house gas (GHG) emissions, and livability in urban areas. Faster travel, however, produces economic benefits. An application of economic analysis could evaluate the trade-offs between lower speeds and alternative investments that do not lower speeds. These include rumble strips, high visibility striping, variable message signing, and other physical safety improvements.

3.3 PROJECT PRIORITIZATION

ITD would like to rank preservation projects statewide: At present, each district determines its priorities for preservation of state highways and bridges within their district given allocations from headquarters mostly independent of the future (forecasted) travel volumes. Economic analysis would rank preservation projects statewide based on the relative significance of each roadways contribution to job retention and creation or based on the output (gross state product or GSP) of businesses served by the roadway segments.

This analysis, however, would depend on the ability of ITD to forecast future travel volumes and the likely diversion to alternative routes if highway segments become too slow from pavement deterioration or budgets become weight restricted. Such forecasts would require ITD to apply some form of TDM, which may provide more accurate and comprehensive results if it included commodity flows at a more detailed zonal level than available from the Freight Analysis Framework (FAF3).

3.4 COMPARE ALTERNATIVE INVESTMENTS WITHIN A CORRIDOR

ITD conducts corridor plans where it evaluates the alternative investments. These corridor-specific planning efforts often focus on alternative alignments, roadway configurations (e.g., number of lanes, lane widths, intersection versus interchanges, passing lanes), and other engineering tradeoffs. Most corridor

analyses measure the performance of each alternative using metrics such as reductions in travel time and travel time reliability, accidents (safety), cost-effectiveness, accessibility, environmental impacts, equity, and funding feasibility. An economic analysis would compare the future benefits each alternative would generate in terms of new employment, business attraction and retention, changes in output (GSP), personal income, and other economic metrics. If the corridor were a significant freight route, an economic analysis would need commodity flow forecasts to fully measure the benefits to specific industries and estimate their respective job creation and impacts of GRP.

3.5 SPECIALIZED ACTIVITIES

These include TIGER grants, port of entry (POE) improvements, new or changes to existing transportation funding sources, targeted economic development initiatives, and value capture policies. This latter example involves applying economic analysis to an ITD initiative to develop a statewide value capture policy. Many states and many more MPOs have implemented funding policies that require new development to pay for a minimum share/match of improvements needed to fully mitigate their impacts of highway congestion. These policies may take the form of development impact fees, assessment districts, or turnkey construction projects. Applying a TDM can quantify the level of capacity improvement needed to mitigate the impacts of the proposed improvement and trace the geographical extent of the developments new generated traffic.

Although it's been used widely in Europe and Latin America, value capture - the concept of asking private landowners to contribute to the cost of infrastructure, for example, in anticipation of the rise of property values such projects bring - has been a little harder to find in the U.S. That may be changing. The rise of value capture has a logical narrative. Infrastructure is crumbling everywhere, as urban population growth requires significant investments. At the same time, governments are struggling with declines in revenue from traditional sources, if not outright fiscal crises.

The idea that public actions, such as investments in infrastructure, the provision of public services, and planning and land use regulation, increase the value of land and property, goes back at least as far as Henry George. If it is possible to capture that value, the economic analysis will center on the best ways to do it.

4.0 Next Steps

This section summarizes our assessment and identifies the next steps for integrating economic analysis into ITD's decision-making. We are recommending that ITD task the appropriate existing management teams with determining (a) if the department wants to fill the gaps we have identified and (b) how to integrate economic analysis into its various planning and programming activities. These committees are then well positioned to determine which methods should be employed to obtain these missing resources.

4.1 FILLING IN THE GAPS

Based on our inventory of ITD's databases and in-house analytical models, followed by our workshops and interviews with ITD staff, we have identified some gaps that ITD will need to close before it can apply economic analysis at each of the five levels of planning activity within ITD. We divide these gaps into data, analytical tools, human resources and institutional culture. We have already described the gaps in each of these categories in Section 2.0. In addition to these specific gaps, we have identified some overarching institutional constraints and impediments to implementing economic analysis. These include the following:

- ITD does not have an overall set of clear, concise goals for its planning and programming activities and this deficiency makes it difficult to define specific objectives for application of economic analysis. Although the Governor's Project 60 states that its goal is to increase the state's gross state product (GSP) from $51 billion to $60 billion, it does not specify the share of this that would be expected from ITD's investments. The proposed development of a department-wide performance-based planning approach would remedy this impediment;
- The recent reorganization of ITD management may have clarified who within the senior management will be responsible for conducting economic analysis and who will present results to stakeholders. Nevertheless, we were not certain if these assignments were clear to the designated ITD staff and if other functions within ITD are clear who owns the implementation of economic analysis;
- This readiness study and its parallel study to determine the need for a TDM will provide cost estimates to acquire missing data and analytical tools. Once these needs and costs are clear, ITD will need to develop a funding plan and implementation timeframe; and
- While many of ITD headquarters staff are aware of the possible applications of economic analysis and the consequences of this on program and project

prioritization, staff in the ITD districts appear less informed but are likely to be impacted if economic analysis is applied to their planning activities. In addition, stakeholder groups and other state government departments are also not aware of how economic analysis could impact their expectations for ITD's support. While there is ample time before the implementation of economic analysis has direct consequences for any of these internal or external stakeholders, ITD should plan to develop a communications and public relations campaign.

4.2 RECOMMENDATIONS

The following are recommendations and next steps for integrating economics into ITD's decision-making.

Establish an Engaged Project Team

To build success and create champions for economic analysis within ITD, it would be important to aseemble an internal team to guide the day-to-day progress and focus on the challenges of eventual implementation throughout ITD. Starting with Paul Steinman, the Chief Operating Officer as the lead champion, the following key ITD staff should be involved:

- Eric a Bowen, Planning and Program Management Manager;
- Jason Brinkman, Transportation Systems Manager;
- Maureen Gresham, Transportation Performance Division;
- Devin Rigby, District Engineer; and
- Dave Tolman, Strategic Funding Specialist.

In addition, we recommend a small technical support staff that would act as subject matter experts and provide assistance as directed by the project team. This assistance could include the following key staff:

- Modelers: Charles Gillin and David Coladner;
- Traffic Engineer: Corey Krantz;
- Planner: Sonna Lynn Fernandez;
- Architect: Brian Reed; and
- Economist: Bob Thompson.

Develop an Overall Framework for Performance-Based Planning

The interviews and workshops affirmed ITD's desire to place economic analysis within a larger framework of performance-based planning. At its core, performance-based planning establishes clear goals, quantitative targets for each goal, and specific metrics that measure progress toward attainment of these

targets. The ultimate purpose of performance-based planning is to help decision makers stay focused on long-term goals and make hard choices. CS recommends ITD implement performance-based planning in parallel to its development and application of economic analysis.

This process requires credible analytical tools which measure benefits and provide decision makers with reliable tradeoffs between hard choices. The ultimate purpose of performance-based planning, therefore, is to help decision makers make hard choices. CS recommends ITD embark on further work towards performance-based planning with the formulation of goals, the establishment of targets, development of metrics, and the implementation of trade-off analysis.

Develop a Statewide Travel Demand Model

We recommend development of a statewide TDM, including the acquisition of a commodity flow database. CS has prepared detailed assessment of ITD readiness to develop a statewide TDM under a separate cover. This effort includes specific recommendations for acquiring the necessary data and human resources.

A. Appendix – Agendas for Workshop and Interviews

Economic and Travel Demand Modeling
Interviews – Day 1

Idaho Transportation Department
3311 W. State Street, Boise, ID 83707-1129
May 14, 2012, 8:00 - 1:00 p.m. – Conference Room 301

AGENDA

Invited Attendees:	Maureen Gresham, Randy Kyrias, Brian Emmen, Glenda Fuller, Nestor Fernandez, Sue Sullivan, Jason Brinkman, Erika Bowen, Mollie McCarty, Jeff Stratten, Doug Benzon, Alan Frew, Brent Jennings, Bob Koeberlein
Support Staff:	Charles Gillin. Sonna Lynn Fernandez, David Coladner, Brian Reed
Consultants:	Wendy Tao, Chris Wornum, David Kurth, Dan Beagan

8:00 – 8:30	Performance Transportation Interviews	Maureen Gresham Randy Kyrias
8:30 – 9:00	GIS, Roadway Data Interviews	Brian Emmen Glenda Fuller
9:00 – 10:00	Resource Center, Environmental, Transportation Systems Management and Planning/Program Management Interviews	Nestor Fernandez Sue Sullivan Jason Brinkman Erika Bowen
10:00 – 11:00	Governmental Affairs, Communications, Economist, and DMV Interviews	Mollie McCarty Jeff Stratten Doug Benzon Alan Frew
11:00 – 11:30	Highway Safety Interviews	Brent Jennings
11:30 – 12:00	Mobility Operations Interviews	Bob Koeberlein
12:00 – 12:30	Summary of Morning Interviews	Support Staff and Consultants
12:30 – 1:00	Set-up for afternoon Executive Staff Workshop	Support Staff and Consultants

Economic Analysis Readiness Assessment
Executive Staff Workshop

Idaho Transportation Department
3311 W. State Street, Boise, ID 83707-1129
May 14, 2012, 1:00 - 5:00 p.m. – Conference Room 212

AGENDA

Invited Attendees:	Brian Ness, Scott Stokes, Paul Steinman, Tom Cole, Mike Golden, Jason Brinkman, Erika Bowen, Devin Rigby, Mollie McCarty, John DeThomas
Staff Support:	Charles Gillin, Sonna Lynn Fernandez, David Coladner, Brian Reed
Consultants:	Wendy Tao, Chris Wornum, David Kurth, Dan Beagan

1:00 – 1:15	Welcome, Introductions, Agenda Overview	Paul Steinman Idaho Transportation Department
1:15 – 2:00	Economic Analysis in Transportation Planning: Applications and Methods	Chris Wornum, Cambridge Systematics
2:00 – 2:10	Q&A and Discussion	Chris Wornum, Cambridge Systematics
2:05 – 2:25	How a Statewide Model Can Help Make Decisions for Planning and Economics	David Kurth, Cambridge Systematics
2:25 – 2:30	Q&A and Discussion	David Kurth, Cambridge Systematics
2:30 – 2:45	Break	
2:45 – 3:15	Overview on Purpose and Themes for the Breakout Sessions	Chris Wornum, Cambridge Systematics
3:15 – 4:00	Breakout Sessions	Facilitators: Chris Wornum, David Kurth, Dan Beagan, Wendy Tao All ITD Staff
4:00 – 4:10	Reports from Breakout Groups	Chris Wornum, Cambridge Systematics ITD Leads from each Breakout Group
4:20 – 4:30	Summary and Discussion	Chris Wornum, Cambridge Systematics
4:30 – 5:00	Closing and Roadmap for Next Steps	Mollie McCarty Idaho Transportation Department

Economic and Travel Demand Modeling
Interviews – Day 2

Idaho Transportation Department
3311 W. State Street, Boise, ID 83707-1129
May 15, 2012, 8:30 - 1:00 p.m. – East Annex Conference Room

AGENDA

Invited Attendees:	Steve Spoor, Gary Sanderson, Don Davis, Ken Helm, Mark Wasdahl, Jack Shambaugh, Chris Peirsol, Bill Shaw, Mary Lockwood
Staff Support:	Charles Gillin. Sonna Lynn Fernandez, David Coladner, Brian Reed
Consultants:	Wendy Tao, Chris Wornum, David Kurth, Dan Beagan

8:30 – 9:00	Operations Interviews	Steve Spoor
9:00 – 9:30	2PM Interview	Sonna Lynn Fernandez Mary Lockwood
9:30 – 10:30	Mobility Operations Interview	Gary Sanderson
11:00 – 12:00	District Planner Interviews	Don Davis Ken Helm Mark Wasdahl Jack Shambaugh Chris Peirsol Bill Shaw
12:00 – 12:30	Summary of Morning Interviews	Support Staff and Consultants
12:30 – 1:00	Set-up for afternoon Executive Staff Workshop	Support Staff and Consultants

Economic Analysis Readiness Assessment
Technical Staff Workshop

Idaho Transportation Department
3311 W. State Street, Boise, ID 83707-1129
May 15, 2012, 1:00 - 5:00 p.m. – Conference Room 200

AGENDA

Invited Attendees:	Mollie McCarty, Erika Bowen, Jason Brinkman, Greg Laragan, Loren Thomas, Nestor Fernandez, Mary Ann Waldinger, Matt Farrar, Doug Benzon, Mike Golden, Dave Tolman
Staff Support:	Charles Gillin. Sonna Lynn Fernandez, David Coladner, Brian Reed
Consultants:	Wendy Tao, Chris Wornum, David Kurth, Dan Beagan, Chandler Duncan

1:00 – 1:15	Welcome, Introductions, Agenda Overview Study Background	Mollie McCarty Idaho Transportation Department
1:15 – 2:00	Economic Analysis in Transportation Planning: Applications and Methods Overview on Purpose and Themes for the Breakout Sessions	Chris Wornum Cambridge Systematics
2:00 – 2:15	Using TREDIS for Economic Analysis	Chandler Duncan, EDR Group
2:15 – 2:45	Breakout Session: Economic Planning Issues	All ITD Staff
2:45 – 3:15	Breakout Session Recap: Economic Planning Issues	Chris Wornum Cambridge Systematics
3:15 – 3:00	Break	
3:00 – 3:30	How a Statewide Model Can Help Make Decisions for Planning and Economics	David Kurth, Dan Beagan Cambridge Systematics
3:30 – 4:00	Breakout Session: Statewide Travel Modeling	All ITD Staff
4:00 – 4:45	Breakout Session Recap: Statewide Travel Modeling	David Kurth, Dan Beagan Cambridge Systematics
4:45 – 5:00	Closing and Roadmap for Next Steps	Mollie McCarty Idaho Transportation Department

Economic and Travel Demand Modeling
Interviews – Day 3

Idaho Transportation Department
3311 W. State Street, Boise, ID 83707-1129
May 14, 2012, 8:30 - 1:00 p.m. – Conference Room 301

AGENDA

Invited Attendees:	Michael Garz, Walter Burnside, others as needed
Support Staff:	Charles Gillin. Sonna Lynn Fernandez, David Coladner, Brian Reed
Consultants:	Wendy Tao, Chris Wornum, David Kurth, Dan Beagan

8:30 – 11:00	**Review of Interviews and/or Follow-up Interviews**	**Support Staff and Consultants**
11:00 – 11:30	Traffic and Programming Interviews	Michael Garz Walter Burnside
11:30 – 12:00	Conclude ITD Interviews What's Next for Consultants	Support Staff and Consultants

Staff Name	Title
Alan Frew	ITD Division of Motor Vehicles Administrator
Bill Shaw	District 6 Senior Transportation Planner
Bob Koeberlein	Mobility Operations Supervisor
Brent Jennings	Highway Safety Engineer
Brian Emmen	GIS Supervisor
Brian Ness	Director
Brian Reed	Enterprise Architect
Charles Gillin	Transportation Services User Manager
Chris Peirsol	District 5 Senior Transportation Planner
Dave Tolman	Strategic Funding Specialist
David Coladner	Research Analysis Principal
Devin Rigby	District 5 Engineer
Don Davis	District 1 Senior Transportation Planner
Doug Benzon	Chief Economist
Erika Bowen	Planning/Program Management Supervisor
Gary Sanderson	Operations Engineer
Glenda Fuller	Roadway Data Supervisor
Greg Laragan	Highway Operations Engineer Manager
Jack Shambaugh	District 4 Senior Transportation Planner
Jason Brinkman	Transportation Services Manager
Jeff Stratten	Communications Manager
John DeThomas	Aeronautics Administrator
Ken Helm	District 2 Senior Transportation Planner
Loren Thomas	Highway Program Oversight Engineer
Mark Wasdahl	District 3 Senior Transportation Planner
Mary Ann Waldinger	COMPASS Modeler
Mary Lockwood	Transportation Planning Specialist
Matt Farrar	Bridge Engineer
Maureen Gresham	Bicycle, Freight, Rail Project Planner
Michael Garz	District 3 Traffic Engineer
Mike Golden	Administration Administrator
Mollie McCarty	Governmental Affairs
Nestor Fernandez	Resource Center Engineer Manager
Paul Steinman	Chief Operating Officer
Randy Kyrias	Transportation Performance Administrator
Scott Stokes	Deputy Director

Staff Name	Title
Sonna Lynn Fernandez	Division of Highways Transportation Planning Coordinator
Steve Spoor	Operations Supervisor
Sue Sullivan	Environmental Planning Manager
Tom Cole	Division of Highways Chief Engineer
Walter Burnside	District 4 Program Management Engineer

B. Appendix – Presentation Slides from Workshops

Economic Analysis Readiness Assessment

Application of Economic Analysis to ITD Planning Activities

presented to

Executive Staff Workshop

presented by

Cambridge Systematics, Inc.

Wendy Tao & Christopher Wornum

May 14, 2012

Transportation leadership you can trust.

Agenda

1:00 – 1:15	Welcome, Introductions, Agenda Overview	Chuck Gillin, ITD
1:15 – 2:00	Economic Analysis in Transportation Planning: Applications and Methods	Chris Wornum, Cambridge Systematics
2:00 – 2:10	Q&A and Discussion	Chris Wornum, Cambridge Systematics
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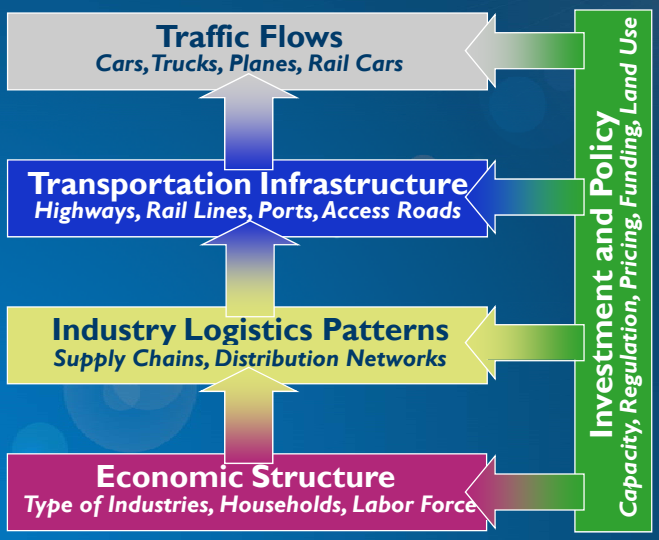
4:30 – 5:00	Closing and Roadmap for Next Steps	Chuck Gillin, ITD

2

Understanding Economic Effects of Transportation



3

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Tiered Framework for DOT Planning Activities

Applications of Economic Analysis to Five Planning Tiers

Optimizing Investment

- Determine optimal level of investment:
  - » Transportation revenues vs. private consumption
  - » Transportation spending vs. other public services

Allocation Among DOT Functions

- Allocation of DOT funding across programs:
  - » Capital expansion vs. preservation
  - » Safety vs. equity

Project Prioritization

- Rank project according to economic benefits :
  - » Goods movement vs. access to labor
  - » State (ITD) vs. regional priorities

Corridor/Alternatives Analysis

- Compare alternative investments within a corridor:
  - » Transit vs. highway expansion
  - » Operational improvements vs. additional lanes

Specialized Activities

- Quantifying benefits to obtain OPM funding:
  - » TIGER Grants
  - » Economic development vs. value capture

1

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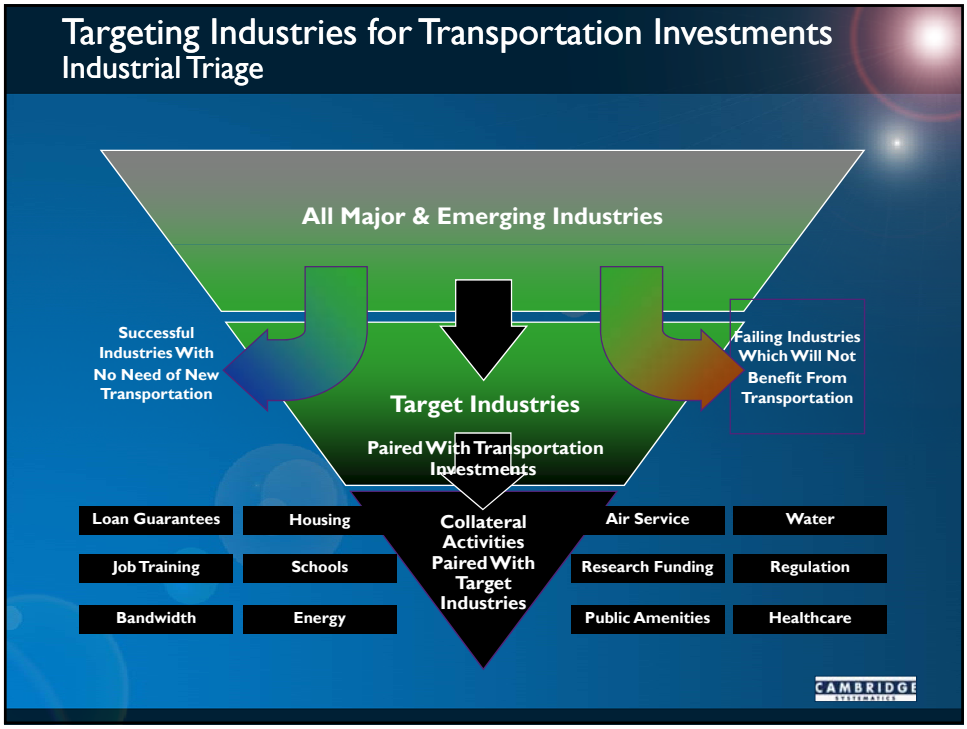
Targeting Industries for Transportation Investments
Industrial Triage
All Major & Emerging Industries
Successful Industries With No Need of New Transportation
Failing Industries Which Will Not Benefit From Transportation
Target Industries
Paired With Transportation Investments
Loan Guarantees
Housing
Job Training
Schools
Bandwidth
Energy
Collateral Activities Paired With Target Industries
Air Service
Water
Research Funding
Regulation
Public Amenities
Healthcare
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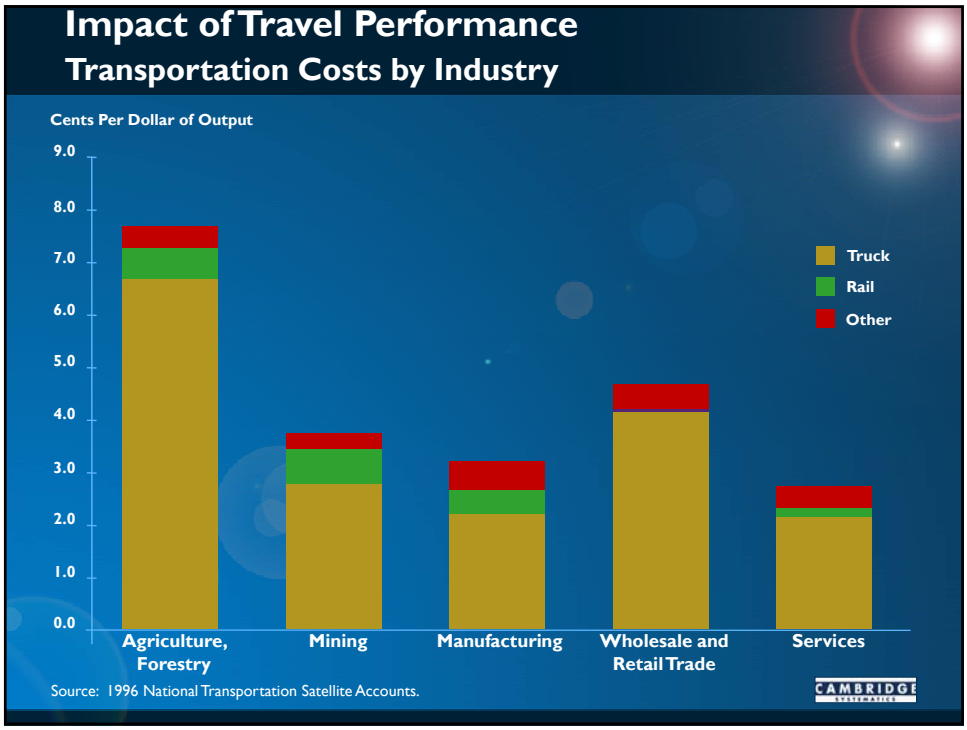
Impact of Travel Performance
Transportation Costs by Industry
Cents Per Dollar of Output
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Truck
Rail
Other
Agriculture, Forestry
Mining
Manufacturing
Wholesale and Retail Trade
Services
Source: 1996 National Transportation Satellite Accounts.
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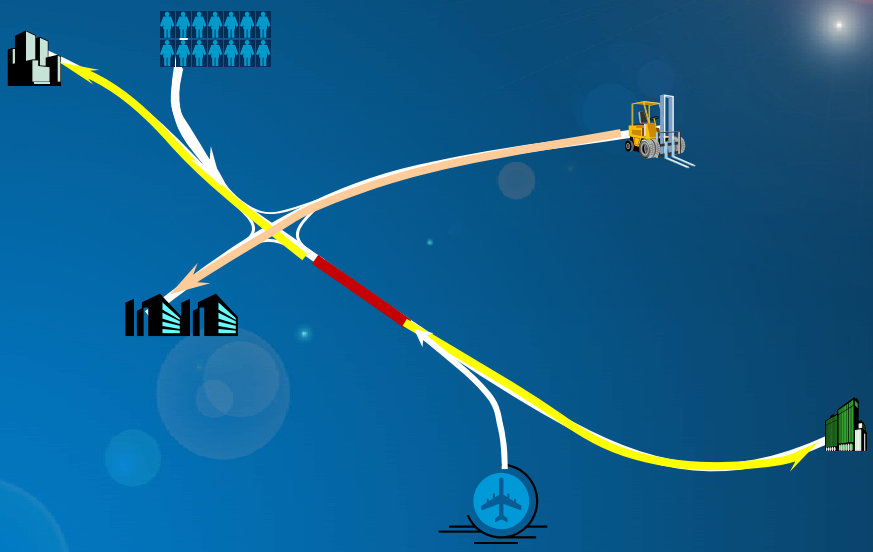
Linking Highway Investments to Industry Competitiveness



Direct User Benefits
Project's Impact on Travel Performance

Direct User Impacts

- Travel volume
- Accidents
- Level of service
  - Recurrent congestion
  - Non-recurrent congestion
- Speed (travel time)
  - Category of road
  - Special conditions
- Operating cost
- Environmental

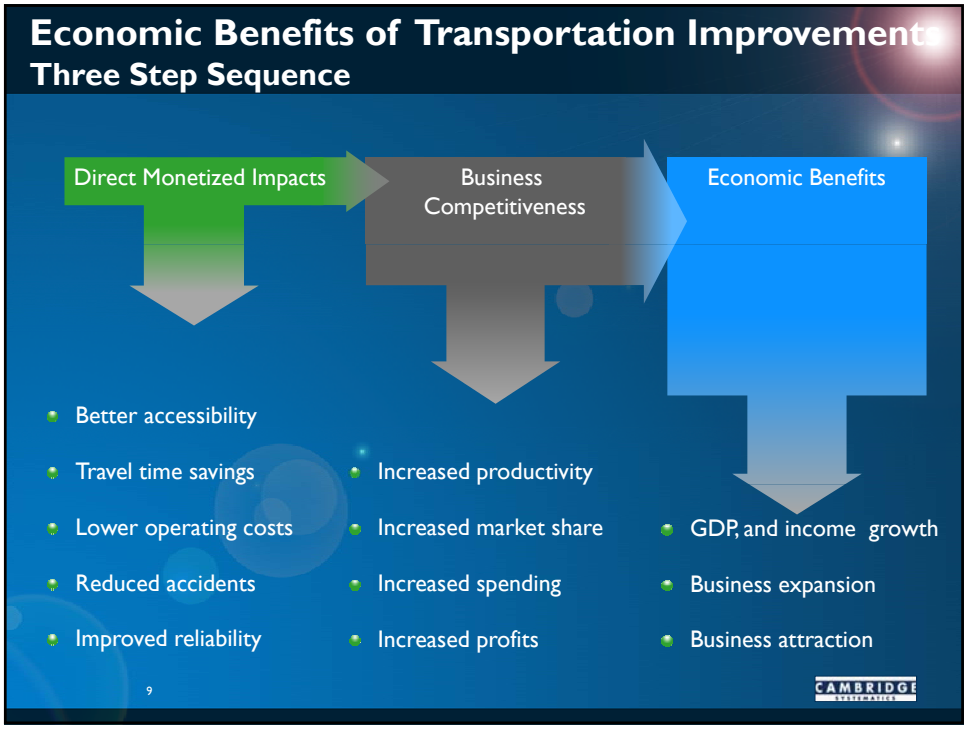
Users

- Truck Trips
  - Non-durables manufacturing
  - Durables manufacturing
  - Agriculture
  - Mining & wood resources
  - Interstate transport services
  - Drayage & warehousing
  - Non-freight/Service delivery
- Auto Trips
  - On-the-clock
  - Commute
  - School
  - Shop
  - Recreation
  - Other

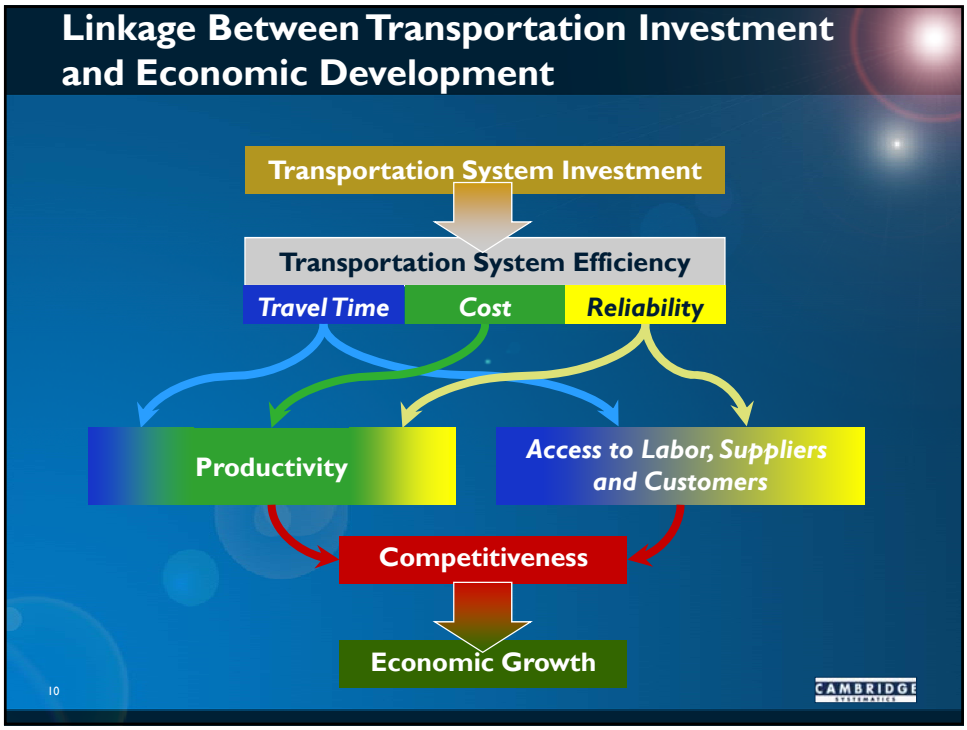
Monetized User Impacts

- Commodity Type
- Trip purpose
- Time of day
- Recurrent vs. non-recurrent delay
- Vehicle type
- Type of accident

Economic Benefits of Transportation Improvements
Three Step Sequence



Linkage Between Transportation Investment and Economic Development



Economic Drivers
The Role of Transportation in State's Economy

- Global and national demand for goods and services is fixed
- For a state to increase its economic growth, it must increase its market share at the expense of other regions
- Two mechanisms to increase the Bay area's economic growth:
  - » Population growth (Workers and consumers)
  - » Productivity
- Transportation necessary but not sufficient to economic development

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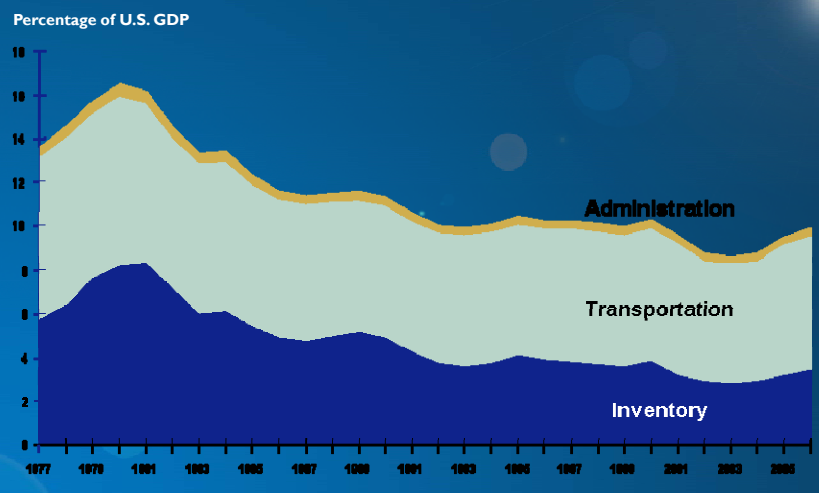
Logistic Adaptation
Share of Total Logistics Cost of U.S. GDP



Source: Rosalyn A. Wilson, *State of Logistics Report*, Council of Logistics Management, 2007.

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Examples of Economic Analysis

- Montana
  - » Build-it-and they-will-come
  - » Targeting Industries
- New Mexico
  - » Increasing Transportation Funding
  - » Benefits of Preservation
- San Francisco Bay Area
  - » More balanced performance based planning
  - » Economic analysis of integrating land use and transportation

13

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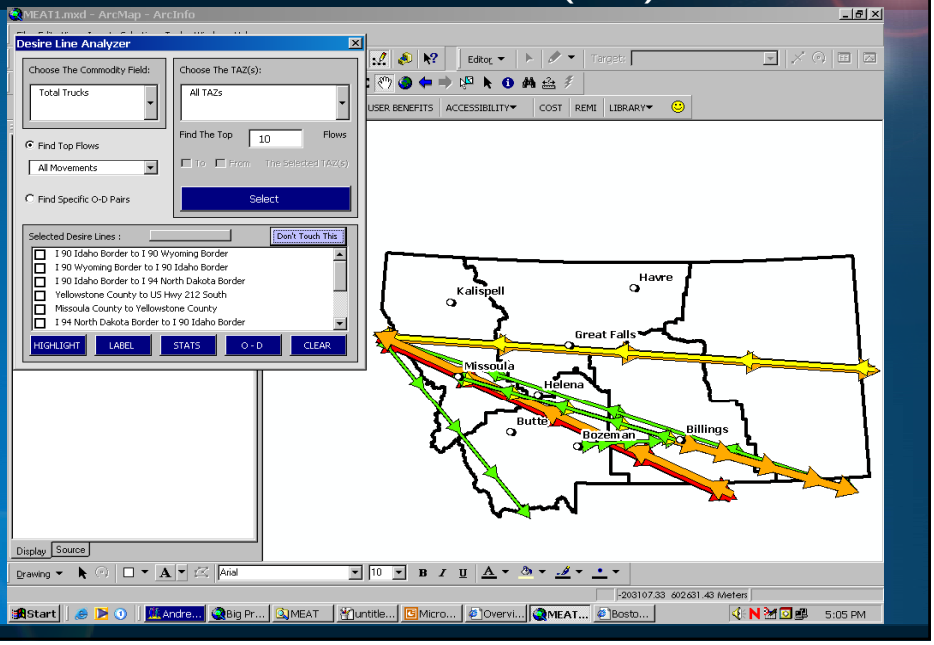
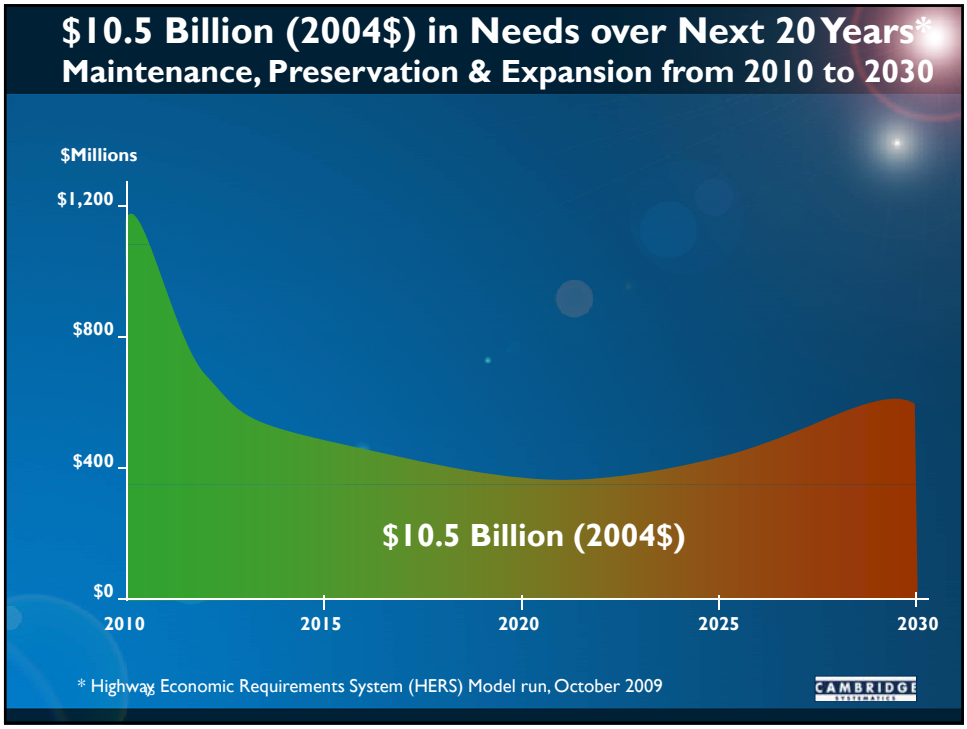
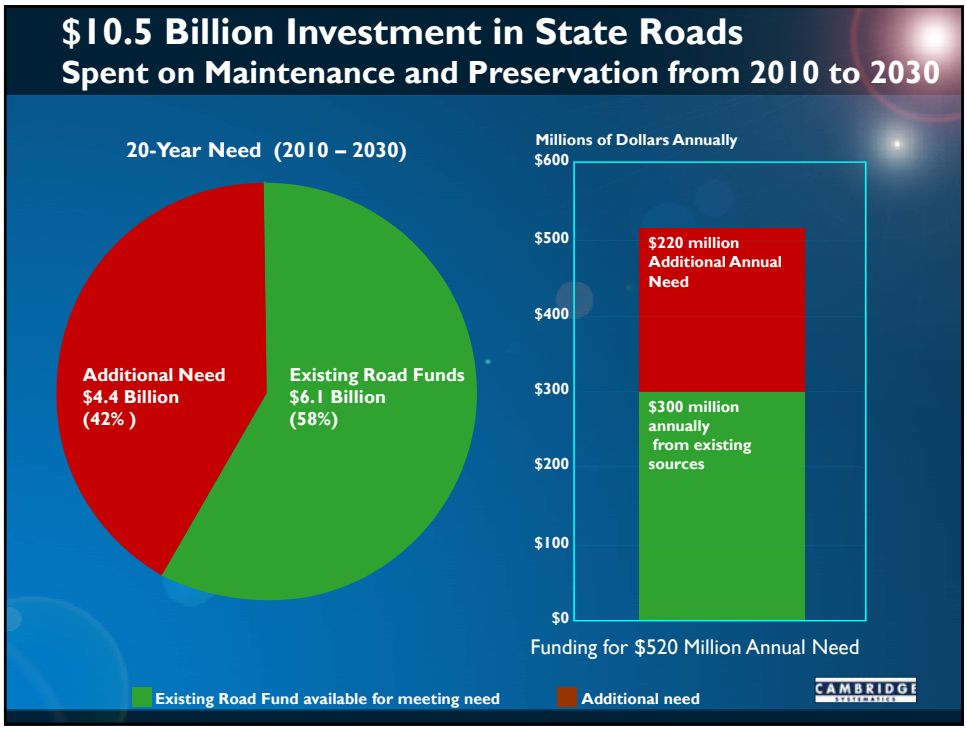
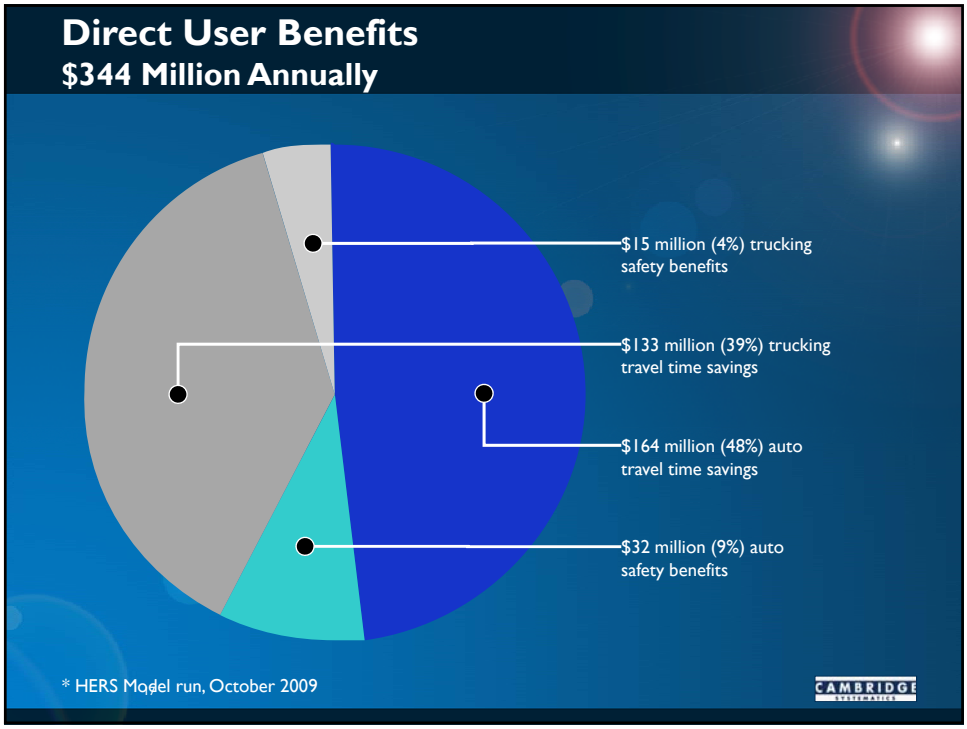
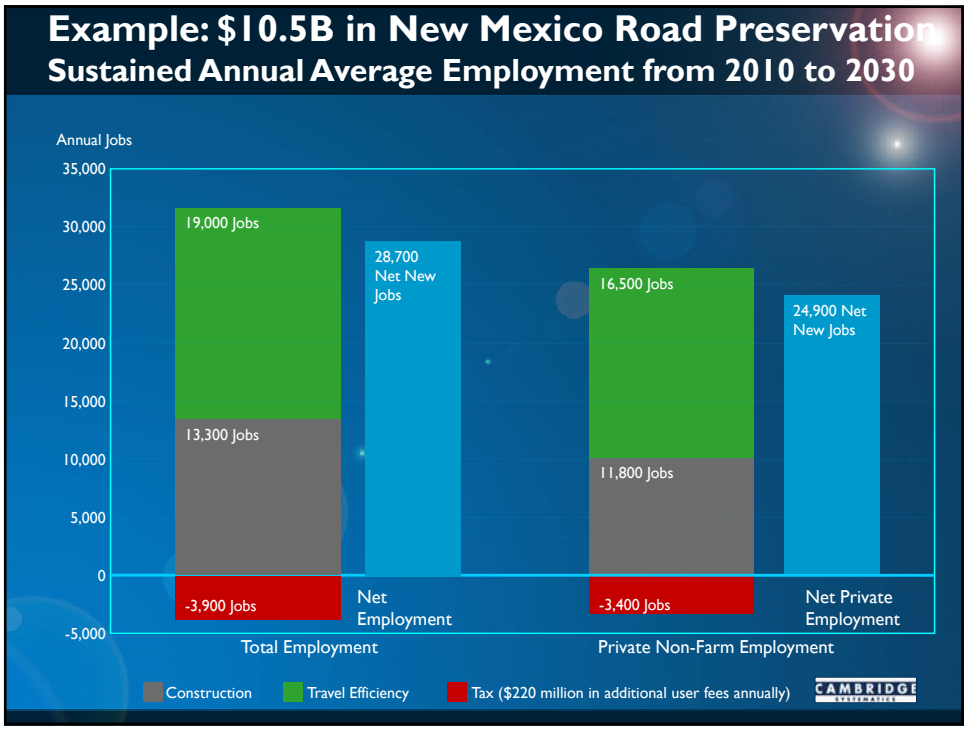
Top 10 Inter-county Flows
All Commodities in Millions of Tons (2001)

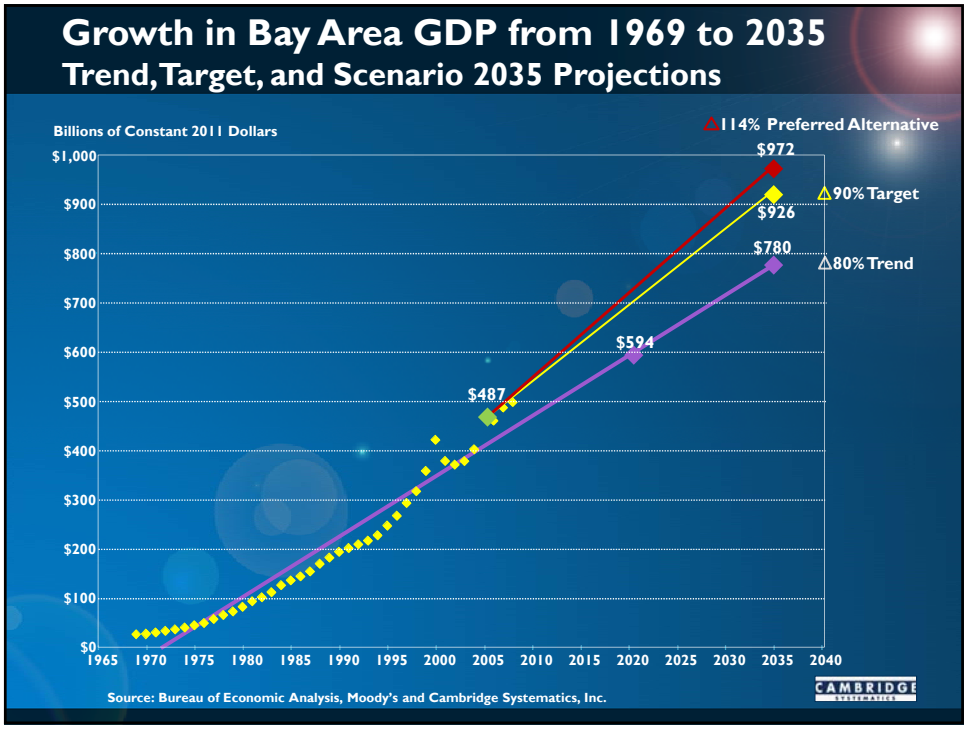


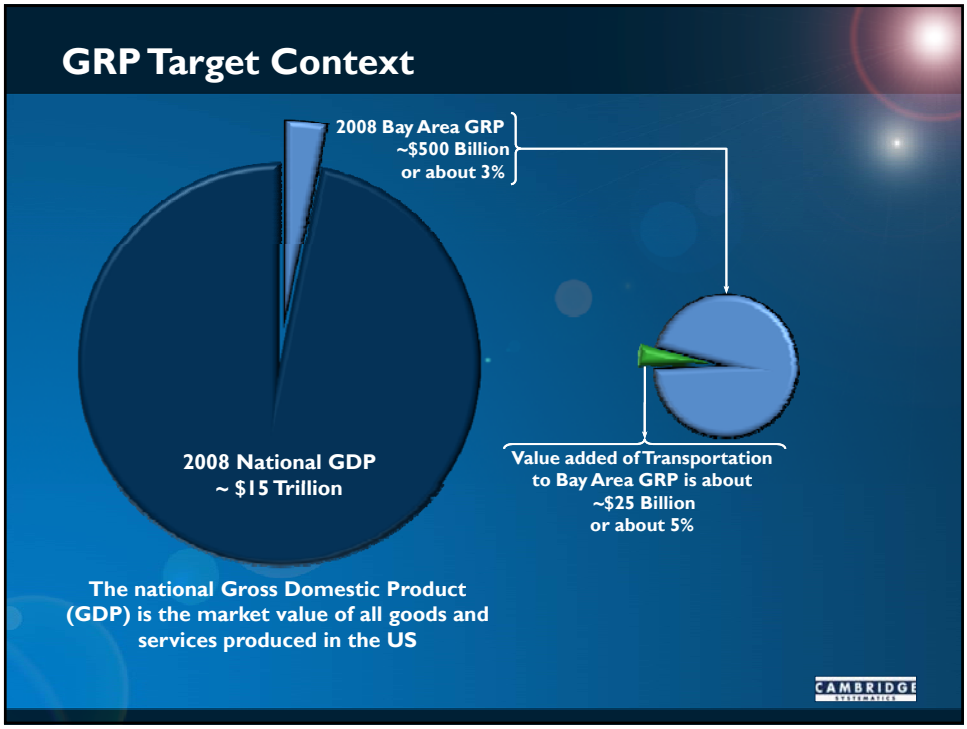

$10.5 Billion (2004$) in Needs over Next 20 Years*
Maintenance, Preservation & Expansion from 2010 to 2030
$Millions
$1,200
$800
$400
$0
$10.5 Billion (2004$)
2010
2015
2020
2025
2030
* Highway Economic Requirements System (HERS) Model run, October 2009
CAMBRIDGE

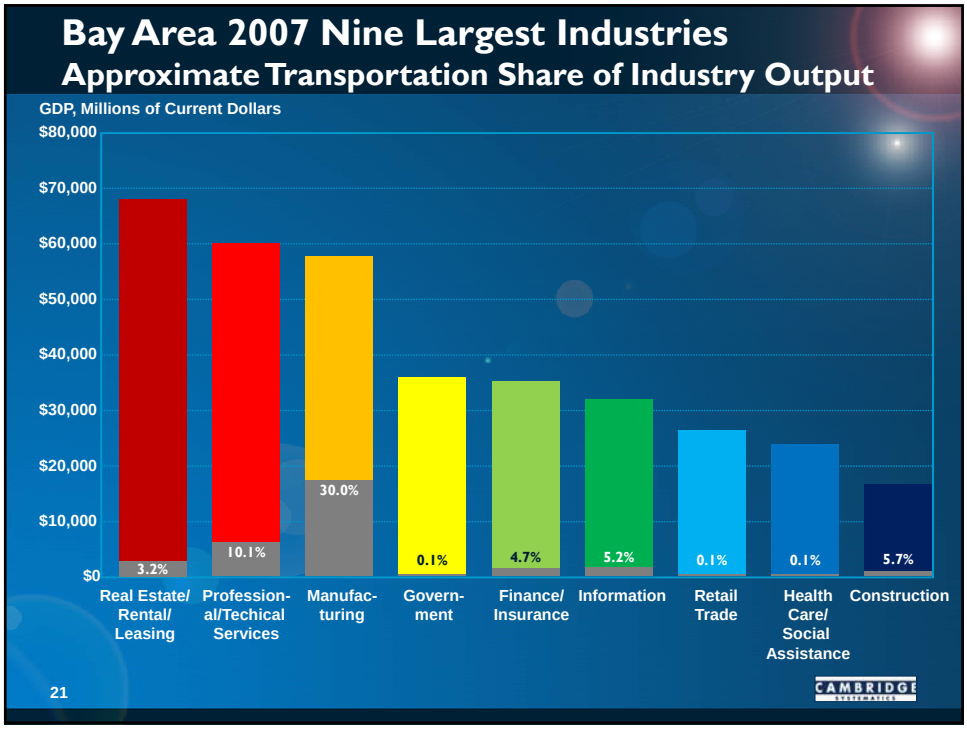

$10.5 Billion Investment in State Roads
Spent on Maintenance and Preservation from 2010 to 2030
20-Year Need (2010 – 2030)
Additional Need
$4.4 Billion
(42%)
Existing Road Funds
$6.1 Billion
(58%)
Millions of Dollars Annually
$600
$500
$400
$300
$200
$100
$0
$220 million
Additional Annual
Need
$300 million
annually
from existing
sources
Funding for $520 Million Annual Need
Existing Road Fund available for meeting need
Additional need
CAMBRIDGE


Direct User Benefits
$344 Million Annually
$15 million (4%) trucking safety benefits
$133 million (39%) trucking travel time savings
$164 million (48%) auto travel time savings
$32 million (9%) auto safety benefits
* HERS Model run, October 2009
CAMBRIDGE


Example: $10.5B in New Mexico Road Preservation
Sustained Annual Average Employment from 2010 to 2030
Annual Jobs
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
-5,000
19,000 Jobs
13,300 Jobs
-3,900 Jobs
28,700 Net New Jobs
16,500 Jobs
11,800 Jobs
-3,400 Jobs
24,900 Net New Jobs
Net Employment
Net Private Employment
Total Employment
Private Non-Farm Employment
Construction
Travel Efficiency
Tax ($220 million in additional user fees annually)
CAMBRIDGE


Growth in Bay Area GDP from 1969 to 2035
Trend, Target, and Scenario 2035 Projections
Billions of Constant 2011 Dollars
114% Preferred Alternative
$972
90% Target
$926
$780
80% Trend
$594
$487
$1,000
$900
$800
$700
$600
$500
$400
$300
$200
$100
$0
1965 1970 1975 1980 1985 1990 1995 2000 2005 2010 2015 2020 2025 2030 2035 2040
Source: Bureau of Economic Analysis, Moody's and Cambridge Systematics, Inc.
CAMBRIDGE


GRP Target Context
2008 Bay Area GRP
~$500 Billion
or about 3%
2008 National GDP
~ $15 Trillion
Value added of Transportation
to Bay Area GRP is about
~$25 Billion
or about 5%
The national Gross Domestic Product
(GDP) is the market value of all goods and
services produced in the US
CAMBRIDGE


Bay Area 2007 Nine Largest Industries
Approximate Transportation Share of Industry Output
GDP, Millions of Current Dollars
$80,000
$70,000
$60,000
$50,000
$40,000
$30,000
$20,000
$10,000
$0
3.2%
10.1%
30.0%
0.1%
4.7%
5.2%
0.1%
0.1%
5.7%
Real Estate/ Rental/ Leasing
Profession- al/Techical Services
Manufac- turing
Govern- ment
Finance/ Insurance
Information
Retail Trade
Health Care/ Social Assistance
Construction
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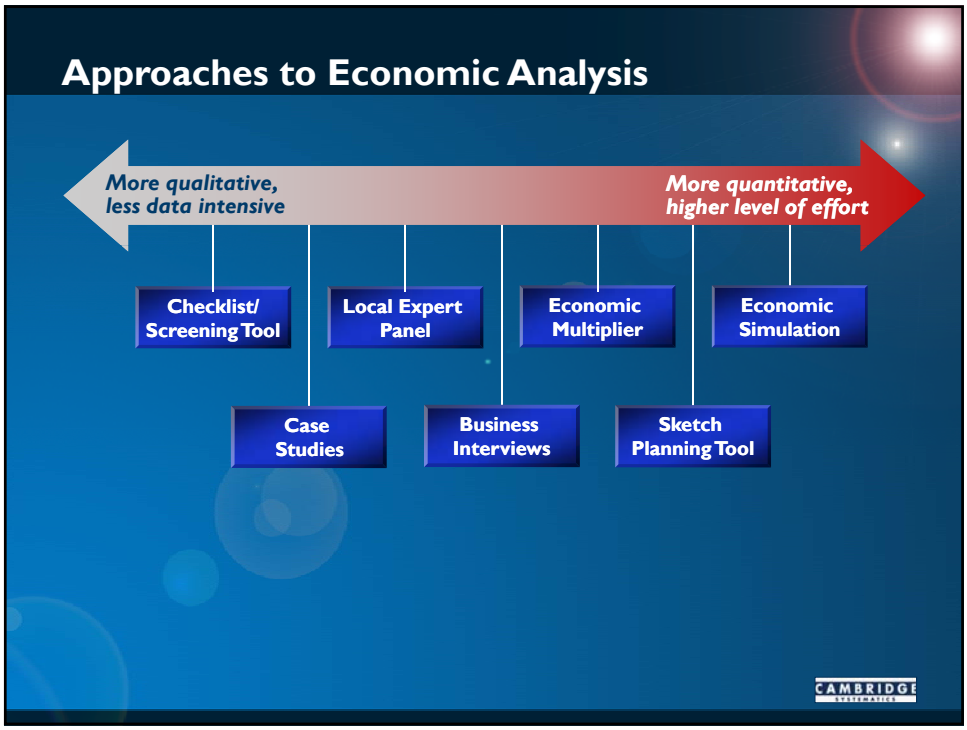
Approaches to Economic Analysis
More qualitative, less data intensive
More quantitative, higher level of effort
Checklist/ Screening Tool
Local Expert Panel
Economic Multiplier
Economic Simulation
Case Studies
Business Interviews
Sketch Planning Tool
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Economic Analysis Readiness Assessment

Application of Economic Analysis to ITD Planning Activities

presented to

Technical Staff Workshop

presented by

Cambridge Systematics, Inc.

Wendy Tao & Christopher Wornum

May 15, 2012

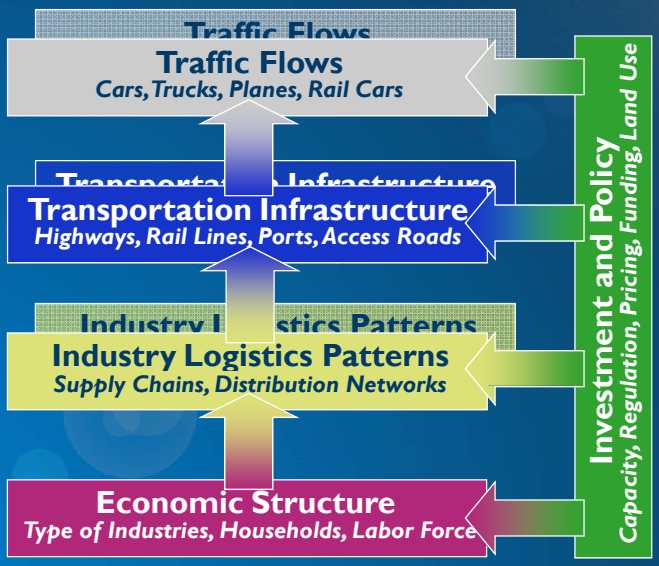
Transportation leadership you can trust.

Agenda

1:00 – 1:15	Welcome, Introductions, Agenda Overview	Mollie McCarty, ITD
1:15 – 2:00	Economic Analysis in Transportation Planning: Applications and Methods	Chris Wornum, Wendy Tao Cambridge Systematics
2:00 – 2:15	Using TREDIS for Economic Analysis	Chandler Duncan, EDRG
2:15 – 2:45	Breakout Session Economic Planning Issues	All ITD Staff
2:45– 3:00	Breakout Session Recap: Economic Planning Issues	Chris Wornum, Cambridge Systematics
3:00 – 3:15	Break	
3:15 – 4:00	How a Statewide Model Can Help Make Decisions for Planning and Economics	David Kurth, Dan Beagan Cambridge Systematics
4:00 – 4:30	Breakout Session: Statewide Travel Modeling	All ITD Staff
4:30 – 4:45	Breakout Session Recap: Statewide Travel Modeling	David Kurth, Cambridge Systematics
4:45 – 5:00	Closing and Roadmap for Next Steps	Mollie McCarty, ITD

2

Understanding Economic Effects of Transportation



3

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Tiered Framework for DOT Planning Activities
Applications of Economic Analysis to Five Planning Tiers

Optimizing Investment

- Determine optimal level of investment:
  - » Transportation revenues vs. private consumption
  - » Transportation spending vs. other public services

Allocation Among DOT Functions

- Allocation of DOT funding across programs:
  - » Capital expansion vs. preservation
  - » Safety vs. equity

Project Prioritization

- Rank project according to economic benefits :
  - » Goods movement vs. access to labor
  - » State (ITD) vs. regional priorities

Corridor/Alternatives Analysis

- Compare alternative investments within a corridor:
  - » Transit vs. highway expansion
  - » Operational improvements vs. additional lanes

Specialized Activities

- Quantifying benefits to obtain OPM funding:
  - » TIGER Grants
  - » Economic development vs. value capture

1

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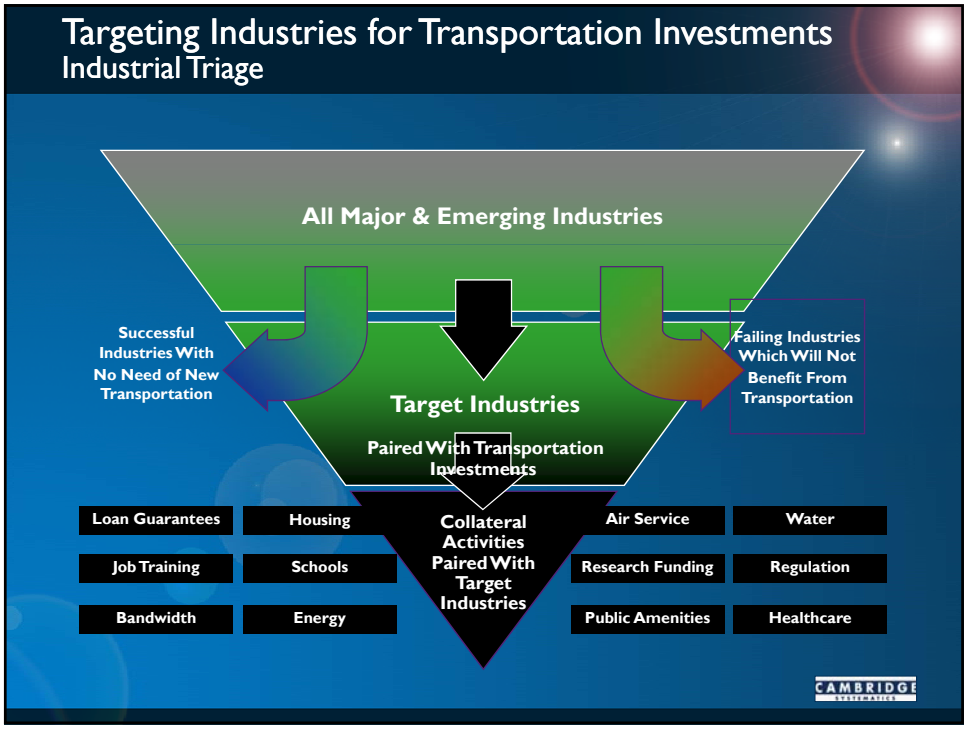
Targeting Industries for Transportation Investments
Industrial Triage
All Major & Emerging Industries
Successful Industries With No Need of New Transportation
Failing Industries Which Will Not Benefit From Transportation
Target Industries
Paired With Transportation Investments
Loan Guarantees
Housing
Job Training
Schools
Bandwidth
Energy
Collateral Activities Paired With Target Industries
Air Service
Water
Research Funding
Regulation
Public Amenities
Healthcare
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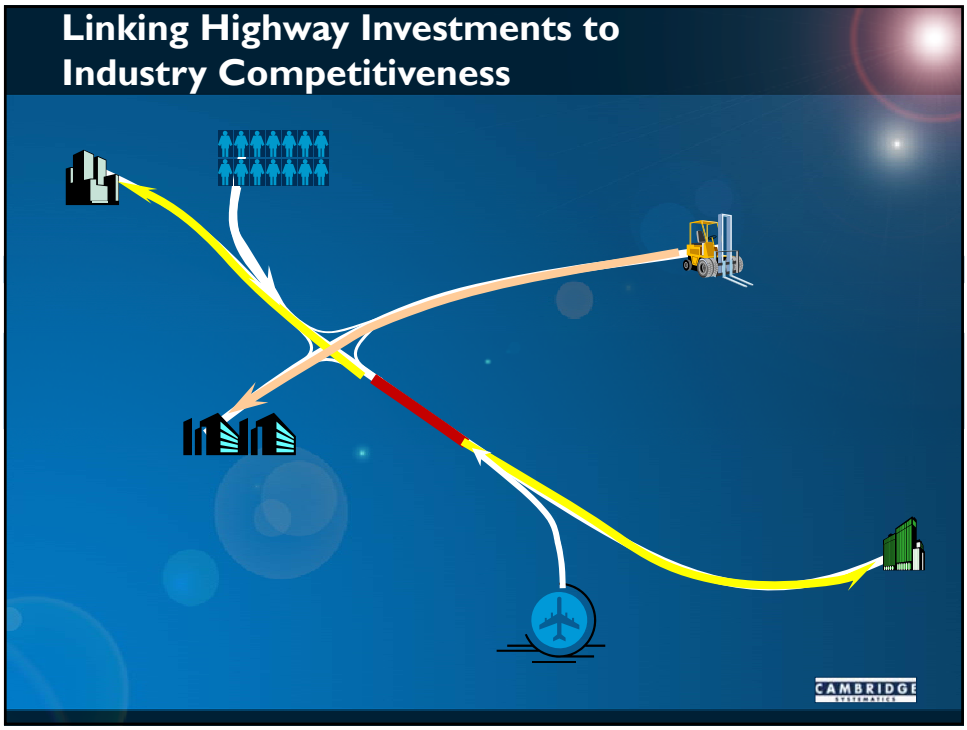
Linking Highway Investments to Industry Competitiveness
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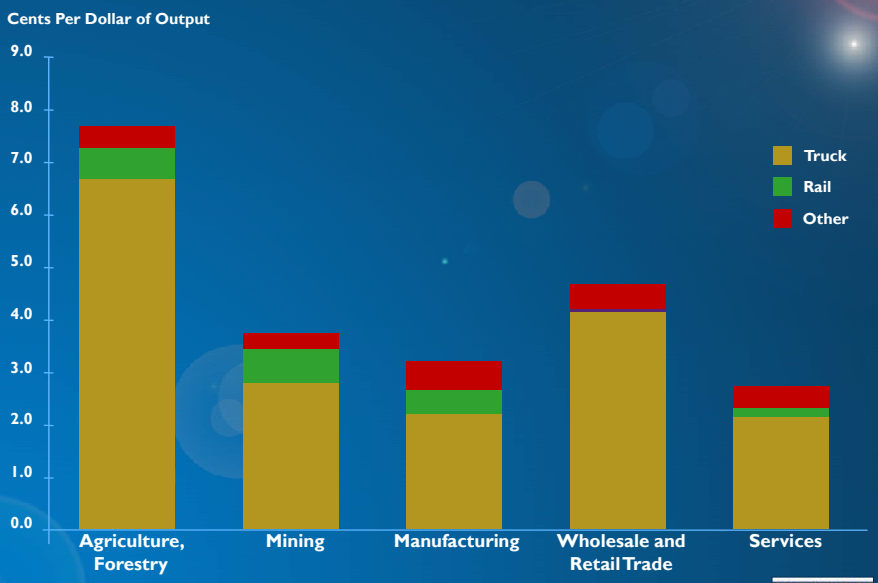
Impact of Travel Performance
Transportation Costs by Industry



Source: 1996 National Transportation Satellite Accounts.

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Direct User Benefits
Project's Impact on Travel Performance

Direct User Impacts

- Travel volume
- Accidents
- Level of service
  - Recurrent congestion
  - Non-recurrent congestion
- Speed (travel time)
  - Category of road
  - Special conditions
- Operating cost
- Environmental

Users

- Truck Trips
  - Non-durables manufacturing
  - Durables manufacturing
  - Agriculture
  - Mining & wood resources
  - Interstate transport services
  - Drayage & warehousing
  - Non-freight/Service delivery
- Auto Trips
  - On-the-clock
  - Commute
  - School
  - Shop
  - Recreation
  - Other

Monetized User Impacts

- Commodity Type
- Trip purpose
- Time of day
- Recurrent vs. non-recurrent delay
- Vehicle type
- Type of accident

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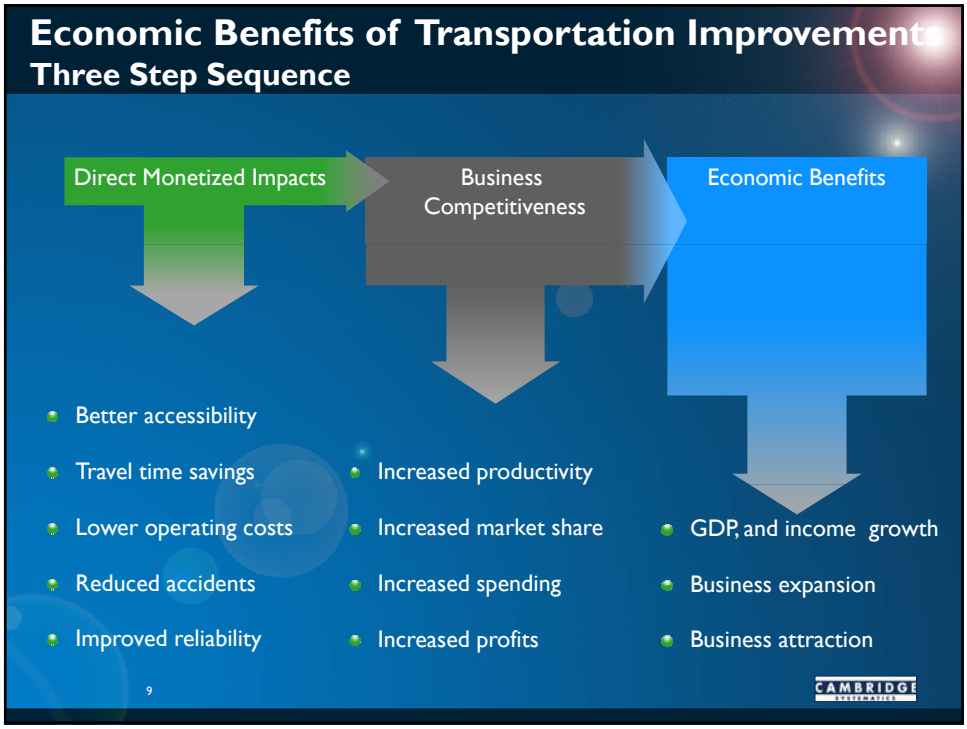
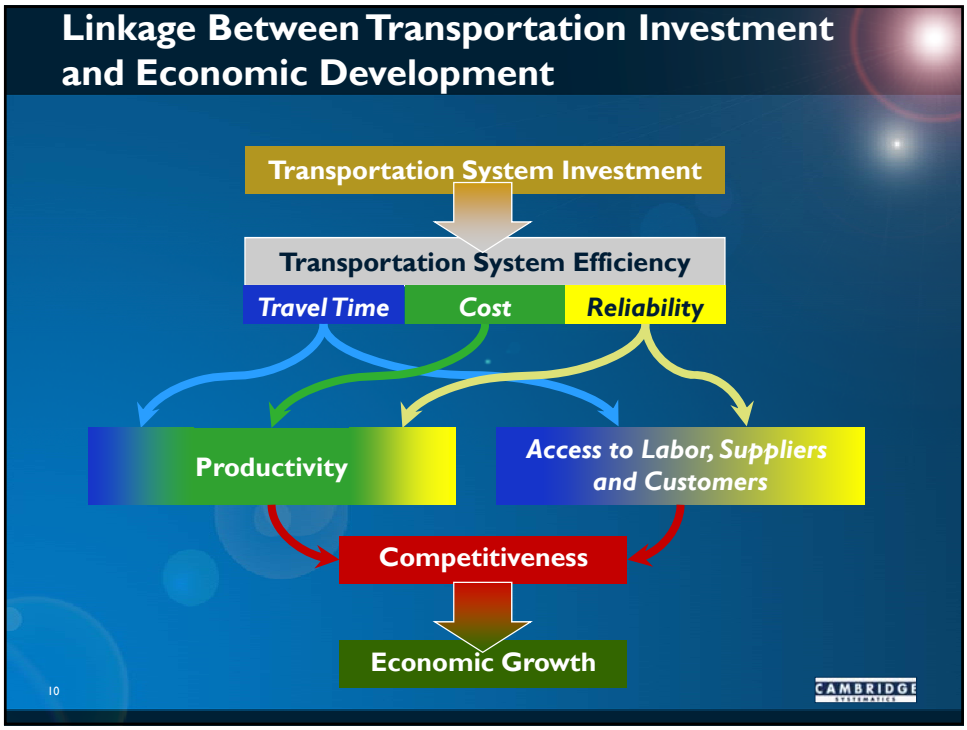
Economic Benefits of Transportation Improvements
Three Step Sequence



Linkage Between Transportation Investment and Economic Development

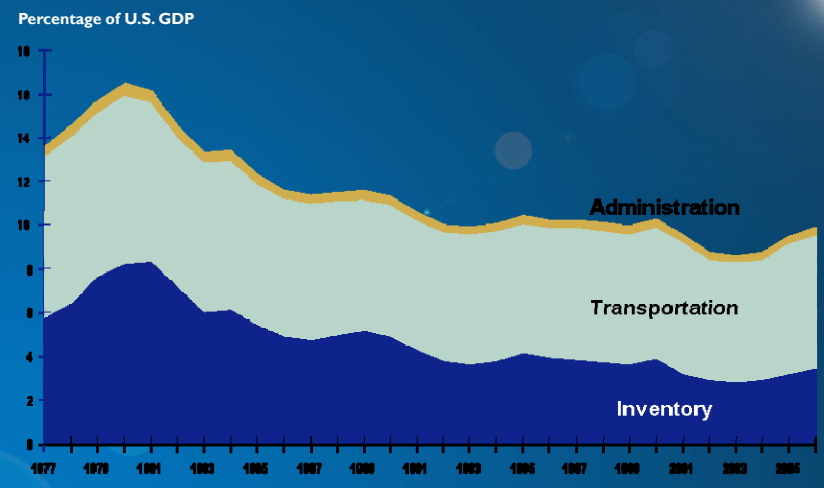


Approaches to Economic Analysis

Economic Drivers
The Role of Transportation in State's Economy

- Global and national demand for goods and services is fixed
- For a state to increase its economic growth, it must increase its market share at the expense of other regions
- Two mechanisms to increase the Bay area's economic growth:
  - » Population growth (Workers and consumers)
  - » Productivity
- Transportation necessary but not sufficient to economic development

Logistic Adaptation
Share of Total Logistics Cost of U.S. GDP



Source: Rosalyn A. Wilson, *State of Logistics Report*, Council of Logistics Management, 2007.

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Examples of Economic Analysis

- Montana
- New Mexico
- San Francisco Bay Area
- Wisconsin DOT TEA Program
- Florida DOT Strategic Investment Tool
- Indiana DOT Major Corridor Investment Benefit Analysis
- Texas DOT Internally Developed PEET
- Georgia DOT Project Selection

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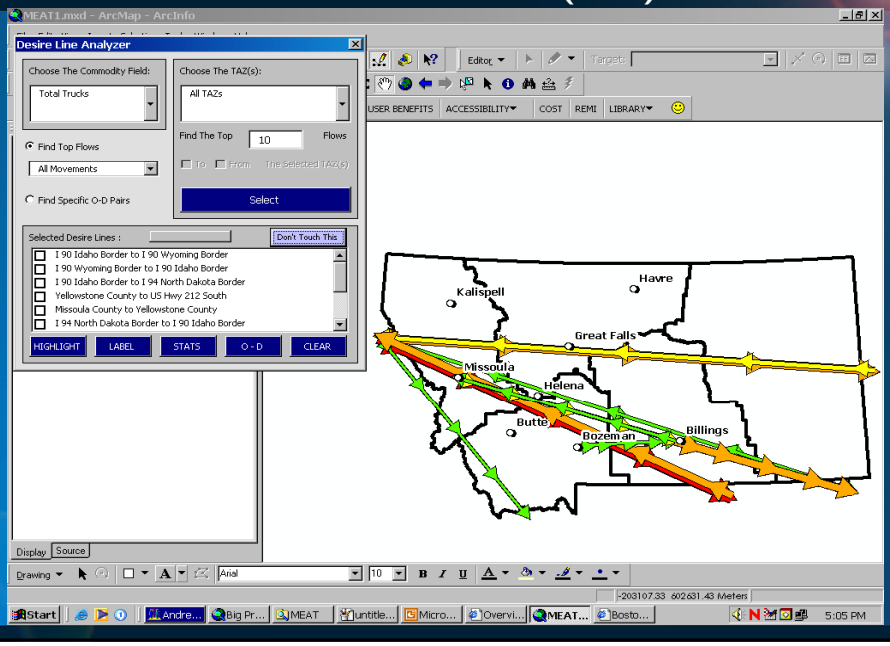
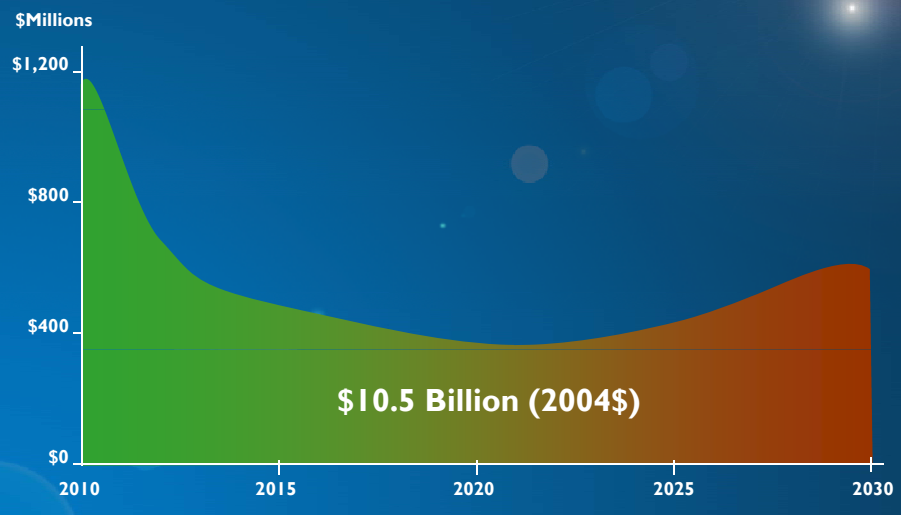
Top 10 Inter-county Flows
All Commodities in Millions of Tons (2001)



$10.5 Billion (2004$) in Needs over Next 20 Years*
Maintenance, Preservation & Expansion from 2010 to 2030



* Highway Economic Requirements System (HERS) Model run, October 2009

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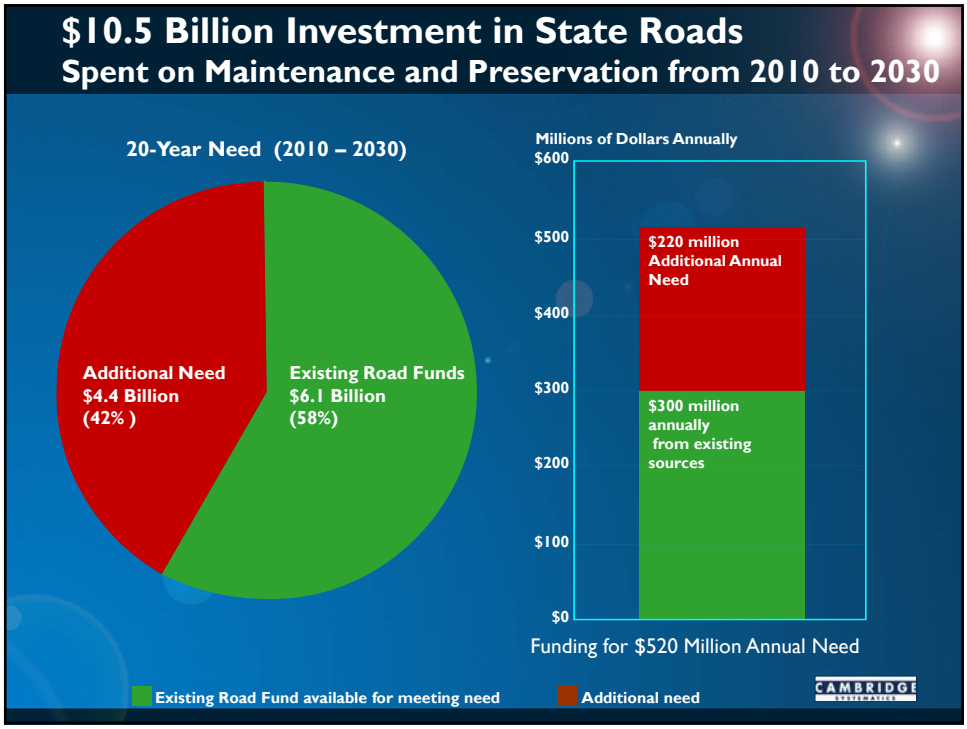
$10.5 Billion Investment in State Roads
Spent on Maintenance and Preservation from 2010 to 2030
20-Year Need (2010 – 2030)
Additional Need
$4.4 Billion
(42%)
Existing Road Funds
$6.1 Billion
(58%)
Millions of Dollars Annually
$600
$500
$400
$300
$200
$100
$0
$220 million
Additional Annual
Need
$300 million
annually
from existing
sources
Funding for $520 Million Annual Need
Existing Road Fund available for meeting need
Additional need
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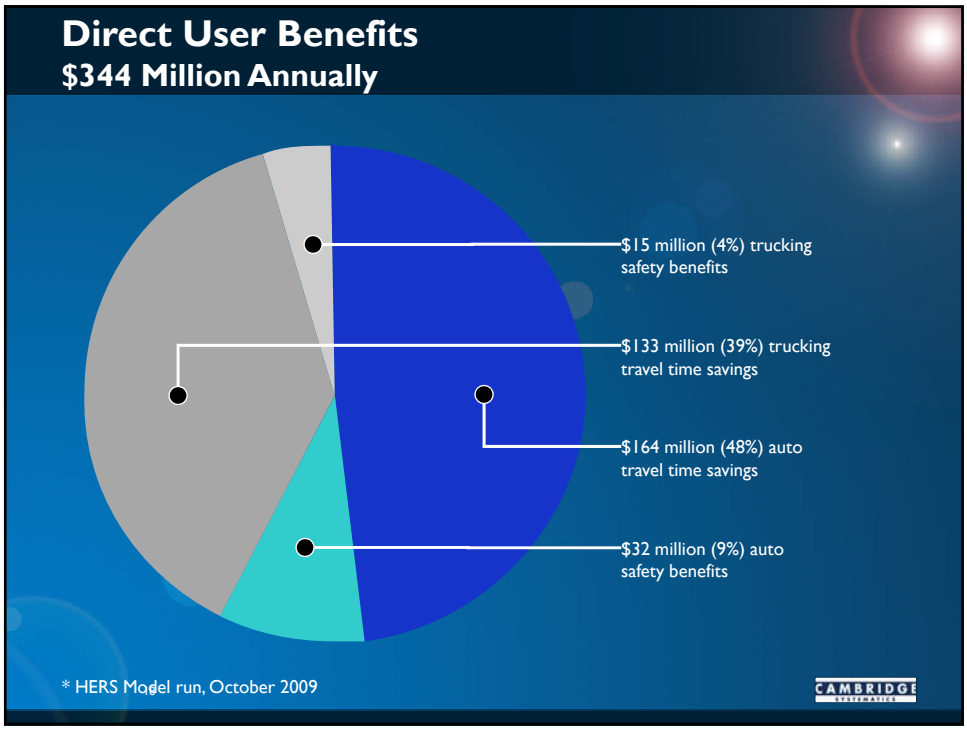
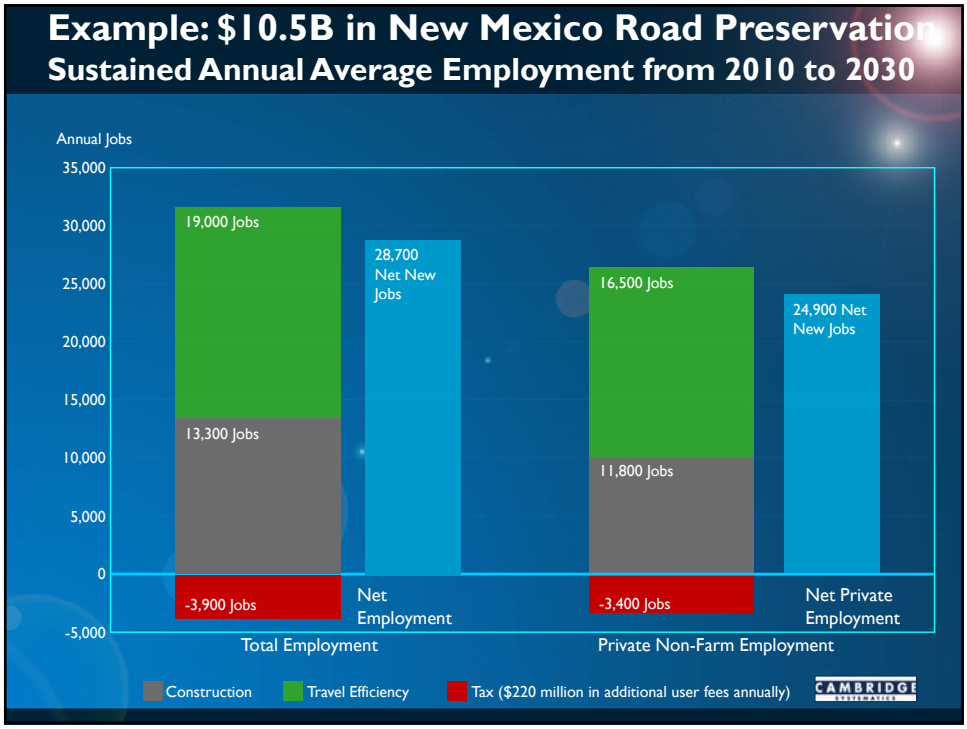
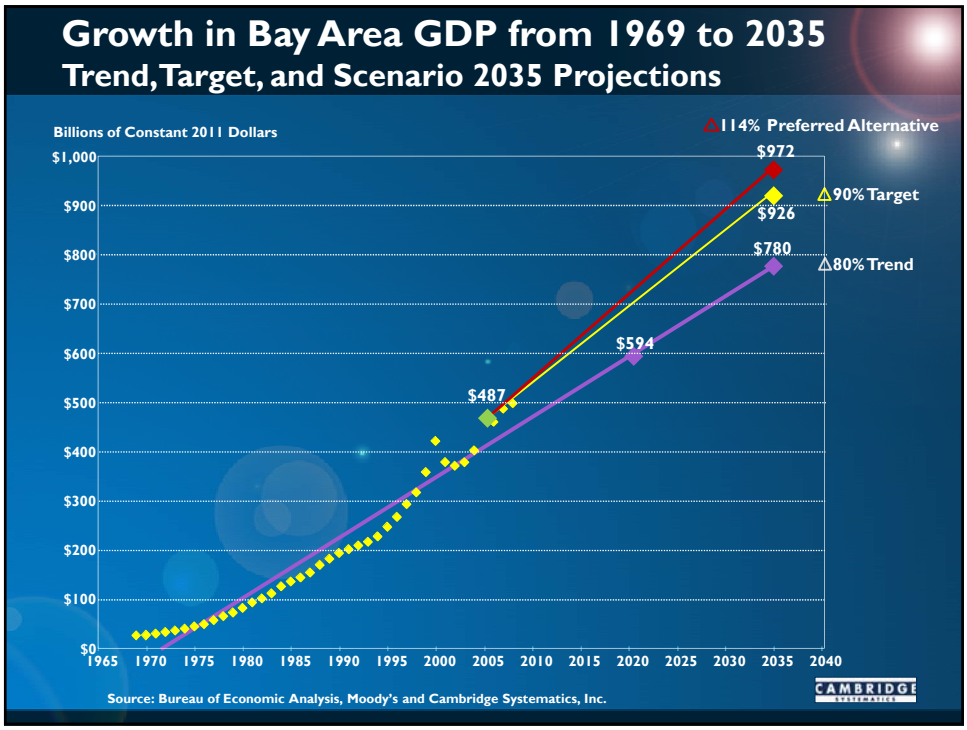

Direct User Benefits
$344 Million Annually
$15 million (4%) trucking
safety benefits
$133 million (39%) trucking
travel time savings
$164 million (48%) auto
travel time savings
$32 million (9%) auto
safety benefits
* HERS Model run, October 2009
CAMBRIDGE


Example: $10.5B in New Mexico Road Preservation
Sustained Annual Average Employment from 2010 to 2030
Annual Jobs
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
-5,000
19,000 Jobs
13,300 Jobs
-3,900 Jobs
28,700 Net New Jobs
Net Employment
16,500 Jobs
11,800 Jobs
-3,400 Jobs
24,900 Net New Jobs
Net Private Employment
Total Employment
Private Non-Farm Employment
Construction
Travel Efficiency
Tax ($220 million in additional user fees annually)
CAMBRIDGE


Growth in Bay Area GDP from 1969 to 2035
Trend, Target, and Scenario 2035 Projections
Billions of Constant 2011 Dollars
114% Preferred Alternative
90% Target
80% Trend
$1,000
$900
$800
$700
$600
$500
$400
$300
$200
$100
$0
$972
$926
$780
$594
$487
1965 1970 1975 1980 1985 1990 1995 2000 2005 2010 2015 2020 2025 2030 2035 2040
Source: Bureau of Economic Analysis, Moody's and Cambridge Systematics, Inc.
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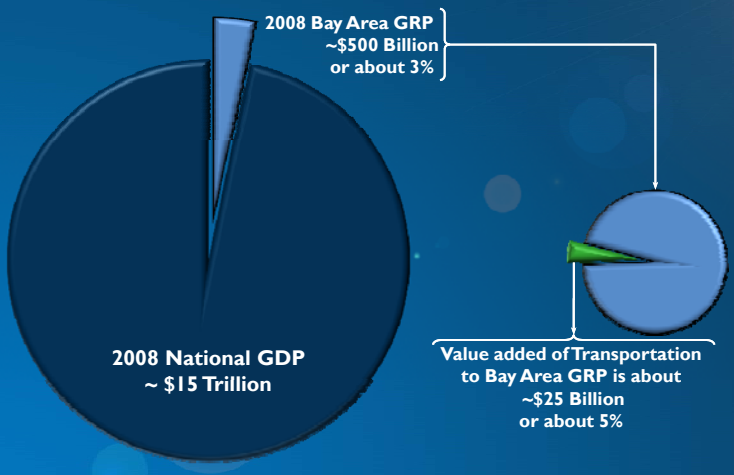
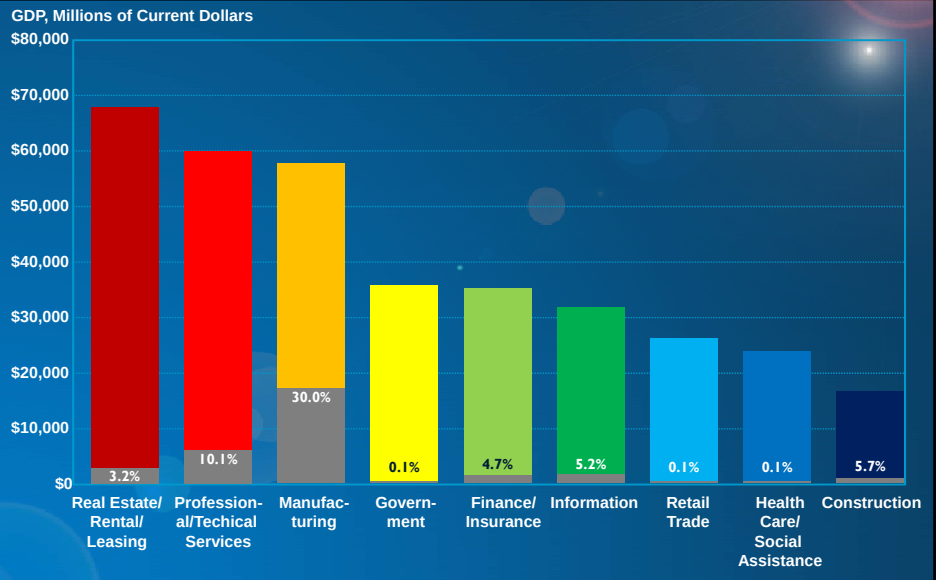
GRP Target Context



The national Gross Domestic Product (GDP) is the market value of all goods and services produced in the US

CAMBRIDGE SYSTEMATICS

Bay Area 2007 Nine Largest Industries
Approximate Transportation Share of Industry Output



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CAMBRIDGE SYSTEMATICS

State DOTs Using Economic Analysis to Optimize Investment

State	Types of Economic Analyses Conducted				
	Optimizing Investment	Strategic Planning/ Program Level	Project Prioritization	Corridor/ Alternatives Analyses	Other (Ad-Hoc, TIGER, etc.)
Michigan	●				
Florida	●				
Missouri					
Indiana	●				
Texas					
Minnesota	●				
Georgia					
Montana					
Kansas	●				
West Virginia					
North Carolina	●				
Wisconsin	●				

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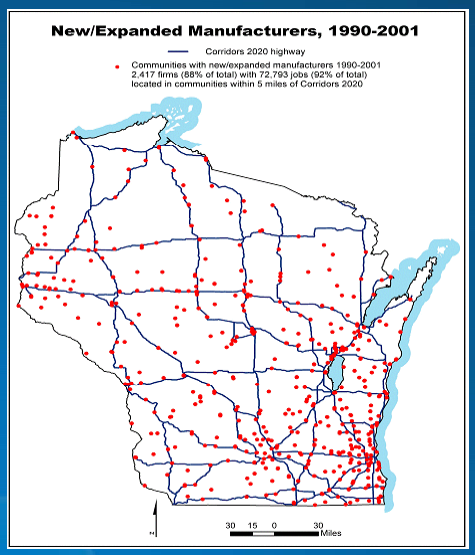
"Making the Case" for Transportation - Wisconsin



- 87 percent of all new and expanded manufacturing businesses within five miles of a Wisconsin 2020 corridor
- Started in 1980s, capacity building, staff training, and a continuous move to improve the technical capacity within the agency

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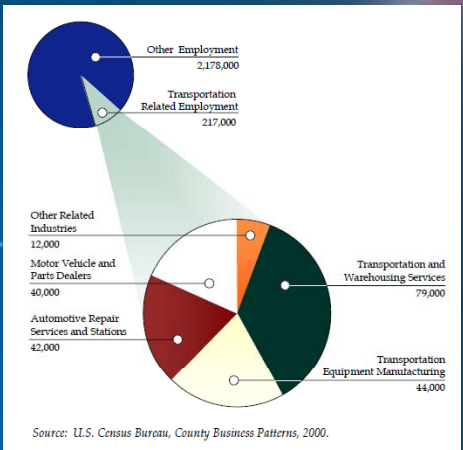
Wisconsin Transportation Economic Assistance (TEA) Program

- Provides 50 percent state grants to:
  - » Governing bodies
  - » Private businesses
  - » Consortiums for road, rail, harbor, and airport projects
- Help attract employers or encourage business and industry to remain and expand in the State
- Up to $1 million.
- 10 to 12 Economic analyses per year



Source: U.S. Census Bureau, County Business Patterns, 2000.

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State DOTs Using Economic Analysis for Strategic Planning/Programming

State	Types of Economic Analyses Conducted				
	Optimizing Investment	Strategic Planning/ Program Level	Project Prioritization	Corridor/ Alternatives Analyses	Other (Ad-Hoc, TIGER, etc.)
Michigan		●			
Florida		●			
Missouri		●			
Indiana		●			
Texas		●			
Minnesota		●			
Georgia		●			
Montana					
Kansas					
West Virginia					
North Carolina		●			
Wisconsin		●			

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Florida DOT Strategic Investment Tool

SIT Highway & Connector Measures

GOAL MEASURED	MEASURES
Safety and Security	Crash Ratio Fatal Crash Ratio Bridge Appraisal Rating Link to Military Base
System Preservation	Volume/Capacity (v/c) Ratio Truck Volume (AADTT) Vehicular Volume (AADT) Bridge Condition Rating
Mobility	Connector Location Volume/Capacity (v/c) Ratio Truck Volume (% Trucks) Vehicular Volume (AADT) System Gap Change in v/c -LOS (for Mainline segments only) Interchange Operations (for Interchange only) Bottleneck/Grade Separation Delay
Economics	Demographic Preparedness Primary Sector Robustness Tourism Intensity Supporting Facilities
Quality of Life	Land and Social Criteria Geology Criteria Habitat Criteria Water Criteria

An interactive Tool to Support the Strategic Intermodal System . Allows users to calculate and report performance measures relating to each of the five SIS goals.

SIS Goals	Number of Measures	Total Points
Safety and Security	4	20
System Preservation	4	20
Mobility	8	20
Economics	4	20
Quality of Life	4	20
TOTAL	24	100

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Florida DOT Strategic Intermodal System (SIS)

- SIS has future traffic level and truck traffic level provided for all Florida DOT districts.
  - » Inconsistencies in data; qualitative estimates vs. demand models vs. growth factors.
  - » Substantial work required to process data for with and without project travel time estimates, VHD, and VMT on common terms.
  - » Recommends incorporating time and resources for review and substantial QA/QC.

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Indiana DOT Major Corridor Investment Benefit Analysis

- MCIBAS Objective and Approach
  - » Link major transportation investments in important corridors to economic development opportunities (for EXPANSION projects only) and develop a system to estimate the economic impacts of highway investments in terms of business expansion, business attraction, and tourism

Tools

- » Indiana Statewide Travel Demand Model (ISTDM)
- » Network-Based User Benefit Cost Analysis (NET_BC)
- » Economic Impact Analysis System (EIAS)
- » Business Expansion Module
- » Business Attraction Module
- » Regional Economic Models, Inc. (REMI)

Challenge: to adapt from project-specific tool to Plan-specific tool

State DOTs Using Economic Analysis for Project Prioritization

State	Types of Economic Analyses Conducted				
	Optimizing Investment	Strategic Planning/ Program Level	Project Prioritization	Corridor/ Alternatives Analyses	Other (Ad-Hoc, TIGER, etc.)
Michigan					
Florida					
Missouri					
Indiana			●		
Texas					
Minnesota			●		
Georgia			●		
Montana					
Kansas			●		
West Virginia			●		
North Carolina			●		
Wisconsin			●		

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Scoring Criteria for Kansas DOT

- Two Macroeconomic Indicators
  - » Anticipated change in study area jobs by 2030.
  - » Anticipated change in net present value of study area GRP/safety benefits by 2030.
- Simple, transparent process
- Governor to Transportation Task Force (T-Link) Blue Ribbon Panel (local officials, construction industry, etc.) was instated to add economic analysis in project selection.

	Engineering Data	Local Consult	Economic Impact
Preservation	100%		
Modernization	80%	20%	
Expansion	50%	25%	25%

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Georgia DOT Project Selection

	SWTP Goals							
Program	Preservation	Safety	Congestion (70%)*	Connectivity Access and Mobility	Economic Growth	Total Score	Benefit / Cost	Other Factors
Roadway Capital Maintenance								
Roadway New Capacity	1. Structural Deficiency 2. PACES Rating	3. Crash Reduction (by severity)	4. Delay Reduction	5. Travel Time: Truck Route/ IM Conn./STRAHNET 6. Activity Center 7. Land Use Plan 8. Access Mgmt.	9. Gross State Product 10. Economic Development Policy Area		B/C	Deliverability, Funding Sources, Readiness, etc.
Roadway Traffic Operations		1. Crash Reduction (by severity)	2. Delay Reduction	3. Travel Time: Truck Route/ IM Conn./STRAHNET 4. Activity Center	5. Gross State Product 6. Economic Development Policy Area		B/C	Deliverability, Funding Sources, Readiness, etc.
Roadway Safety								
Transit								
Intermodal								
Demand Mgmt.								
Economic Development	1. Structural Deficiency 2. PACES Rating	3. Crash Reduction (by severity)	4. Delay Reduction	5. Travel Time: Truck Route/ IM Conn./STRAHNET 6. Activity Center 7. Land Use Plan 8. Access Mgmt.	9. Gross State Product 10. Economic Development Policy Area		B/C	Deliverability, Funding Sources, Readiness, etc.
Enhancement								

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State DOTs Using Economic Analysis for Corridor/Alternatives Analysis

State	Types of Economic Analyses Conducted				
	Optimizing Investment	Strategic Planning/ Program Level	Project Prioritization	Corridor/ Alternatives Analyses	Other (Ad-Hoc, TIGER, etc.)
Michigan					
Florida				●	
Missouri				●	
Indiana					
Texas				●	
Minnesota					
Georgia					
Montana				●	
Kansas					
West Virginia					
North Carolina					
Wisconsin				●	

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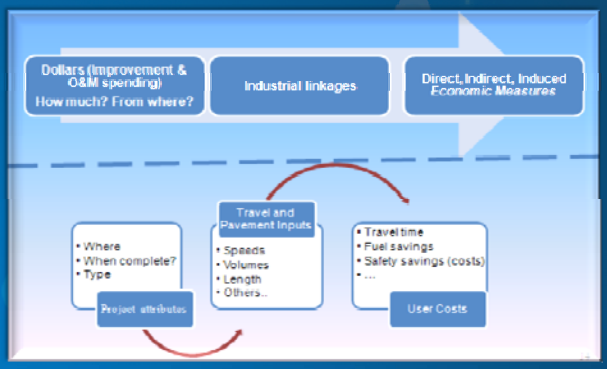
Texas DOT Internally Developed PEET

- PEET (Project Economic Evaluation Tool) to do a sketch-planning assessment for project alternatives.



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State DOTs Using Economic Analysis for Other Specialized Analysis

State	Types of Economic Analyses Conducted				
	Optimizing Investment	Strategic Planning/ Program Level	Project Prioritization	Corridor/ Alternatives Analyses	Other (Ad-Hoc, TIGER, etc.)
Michigan					
Florida					●
Missouri					●
Indiana					●
Texas					●
Minnesota					●
Georgia					
Montana					●
Kansas					
West Virginia					●
North Carolina					●
Wisconsin					●

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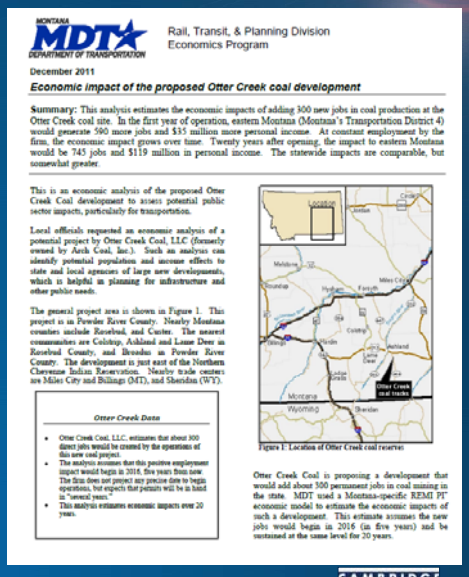
Montana DOT's "Quick-Hit" Analyses

- Benefit-cost analyses (for loans and grant applications – TIGER, Rail-loan funds).
- Policy brief economic impact analysis for proposed coal mines and local transit systems (urban bus systems) at an industry scale.
- Socioeconomic analysis. In the past, Montana DOT would hire them out as one chapter of an environmental analysis. Each of these analyses that is generated in-house can save $4,000, and maintain a level of consistency.



MONTANA MDT DEPARTMENT OF TRANSPORTATION

Rail, Transit, & Planning Division
Economics Program

December 2011

Economic impact of the proposed Otter Creek coal development

Summary: This analysis estimates the economic impacts of adding 300 new jobs in coal production at the Otter Creek coal site. In the first year of operation, eastern Montana (Montana's Transportation District 4) would generate 590 more jobs and $35 million more personal income. At constant employment by the firm, the economic impact grows over time. Twenty years after opening, the impact to eastern Montana would be 745 jobs and $119 million in personal income. The statewide impacts are comparable, but somewhat greater.

This is an economic analysis of the proposed Otter Creek Coal development to assess potential public sector impacts, particularly for transportation.

Local officials requested an economic analysis of a potential project by Otter Creek Coal, LLC (formerly owned by Arch Coal, Inc.). Such an analysis can identify potential population and income effects to state and local agencies of large new developments, which is helpful in planning for infrastructure and other public needs.

The general project area is shown in Figure 1. This project is in Powder River County. Nearby Montana counties include Rosebud, and Custer. The nearest communities are Colstrip, Ashland and Lame Deer in Rosebud County, and Broadus in Powder River County. The development is just east of the Northern Cheyenne Indian Reservation. Nearby trade centers are Miles City and Billings (MT), and Sheridan (WY).

Otter Creek Data

- Otter Creek Coal, LLC, estimates that about 300 direct jobs would be created by the operations of this new coal project.
- The analysis assumes that this positive employment impact would begin in 2016, five years from now. The firm does not project any precise date to begin operations, but expects that permits will be in hand in "several years."
- This analysis estimates economic impacts over 20 years.

Figure 1: Location of Otter Creek coal reserves

Otter Creek Coal is proposing a development that would add about 300 permanent jobs in coal mining in the state. MDT used a Montana-specific REMI PI+ economic model to estimate the economic impacts of such a development. This estimate assumes the new jobs would begin in 2016 (in five years) and be sustained at the same level for 20 years.

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C. Appendix – White Paper: Synthesis of State DOT Approaches to Economic Analysis

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Economic Analysis Readiness Assessment

Task 1 – Synthesis of State DOT Approaches to Economic Analysis

final

white paper

prepared for

Idaho Transportation Department

prepared by

Cambridge Systematics, Inc.

June 2012

www.camsys.com

final white paper

Economic Analysis Readiness Assessment

Task 1 – Synthesis of State DOT Approaches to Economic Analysis

prepared for

Idaho Transportation Department

prepared by

Cambridge Systematics, Inc.
555 12th Street, Suite 1600
Oakland, CA 94607

date

June 2012

Table of Contents

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Executive Summary

The planning activities state Departments of Transportation (DOT) must contend with are full of competing and difficult choices; the allocation of scarce resources between diverse and sometimes conflicting priorities a major challenge. As if this were not enough, state DOTs must communicate to groups of stakeholders with widely divergent priorities and levels of sophistication to explain the rationale for hard choices. Performance-based planning holds out the promise that the application of sound, quantitative measurements of a plan's performance can resolve many of these struggles. Indeed, the research underway and documented in this paper indicates many of the state DOTs employing performance-based planning have gained credibility with their elected overseers, stakeholders, and the general public.

This credibility is mixed and fragile in many states where DOTs are conducting strategic planning in the harshest financial environments state DOTs have ever faced. In their current strategic planning cycle, state DOTs are faced with accelerating decline in gas tax revenue, the lack of Federal reauthorization, and an aging asset base that is forcing larger allocations of scarce transportation funds to state of good repair. These challenges are further compounded by the fiscal crises facing local governments, leading state DOTs to either take on local and regional transportation responsibilities, or share more of their state funding sources with local and metropolitan transportation agencies.

In these times of hard choices, state executives and legislators are embracing their DOT's adoption of performance-based planning. Performance-based planning provides objective criteria for allocating investments across a wide portfolio of needs, and offers a more transparent and compelling rationale to communicate investment priorities to stakeholders and disgruntled advocates. In particular, economic analysis appears to be an extremely popular and effective element of a performance-based approach because the current recession has focused the public's attention on a national debate over raising taxes to fund critical public needs, cutting taxes to stimulate consumption and economic growth, and reducing the public debt. For those policy-makers and tax payers who are not ideologues, credible economic analysis would help them understand the tradeoffs embedded in this debate. For transportation spending, in particular, economic analysis would inform them their state government should spend only existing revenues, increase taxes, or cut taxes to fund a preferred set of priorities in order to expand their state's economy.

These times of tough choices present DOTs with an opportunity to push performance-based planning through its adolescence, and establish a mature doctrine for future strategic planning and project prioritization. But if state DOTs want to leverage this opportunity, they must develop the data and tools to

perform credible economic analysis, and most critically the mindset and understanding of their decision-makers at all levels of their planning activities.

This paper, therefore, presents the experience of state DOTs applying economic analysis at all levels of their planning activities. In order to organize and make sense of all these applications, we have constructed a typology of state DOT planning activities and organized these applications according to which category they belong. The following typology has five levels of planning activities, which appear to be universal for every state DOT we have investigated. They are arranged in a hierarchy from the most statewide policy decisions down to project prioritization on specific corridors. In order to understand how economic analysis may apply at each level of a state's transportation planning hierarchy, we must first define these five levels of planning activities:

1. **Economic analyses to determine amount of investment**. At the highest level of policy debate, economic analysis helps to determine the optimal amount of investment needed to meet transportation needs versus either more public spending for other public services (e.g. education, health care, public safety, etc.) or lower taxes to stimulate more private consumption. The demand for economic analysis at this level may be motivated by one or more of three objectives:

   a. The state's executive or legislature who demands that state government catalyzes economic growth by increasing transportation investments.

   b. The need to reverse declining or stagnant revenues that are forcing tough cuts to state services. Economic analysis provides some rationale for making tough choices about which state services may be cut with minimal damage to the state's economic health.

   c. The need to raise state revenues, either to fund multiple state services or for transportation exclusively. This objective must overcome voter skepticism that raising taxes will do more harm to the economy than the benefits derived from increased investment.

   Economic analysis applied at this level must demonstrate causality between increasing transportation spending and achieving the stated objective, so the design and execution of the economic analysis must tell a compelling story.

2. **Economic analyses at a strategic planning or programming level.** Economic analysis helps compare alternative investment scenarios, where each scenario includes different budget amounts (i.e. with or without a gas tax increase); spending priorities (i.e. preservation versus capacity expansion, highway versus transit); or program emphasis (i.e. safety versus congestion relief). The net economic consequences of each scenario are then compared to a no-project or business-as-usual (BAU) base-case scenario.

3. **Economic analyses for project prioritization.** To help inform project prioritization, economic analysis takes the direct benefits from alternative transportation projects or bundles of projects; and transform these into

changes in employment, personal income, and output (i.e. gross state or regional product). This transformation converts direct benefits, such as faster or more reliable travel time, fewer accidents, access to more workers, or suppliers or customers for businesses, to economic impact by calculating how these benefits are exploited by businesses and workers to increase their competitiveness vis-a-vis their competition. If a firm becomes more productive than its competitors outside the state because its cost to transport its product to market is reduced by a faster highway, it will gain market share at the expense of its competitors who did not receive the benefits from a faster highway (assuming all other conditions held constant). Economic analysis may be used for project prioritization in combination with more traditional performance measures, such as cost-effectiveness and benefit-cost analysis (i.e., return on investment). Economic analyses may rank projects differently than conventional performance measures, such as travel time (congestion), equity, environmental impacts, safety, preservation, transit ridership, and access to jobs. Such results may force policy-makers to reexamine their priorities and accept some difficult tradeoffs between economic growth, livability, and equity.

4. **Economic analyses to support corridor planning or alternatives analysis.** As part of an environmental process or as a preliminary corridor planning exercise, economic analysis can help evaluate different modes (i.e. transit versus highway widening or high-occupancy (HOV) vehicle lanes versus mixed-flow); route alignments; capital versus operational investments (i.e. intelligent transportation systems (ITS) versus additional lanes); or other differences between alternatives. Economic impacts are only one part of the full process for assessing project design alternatives, but it can be particularly important if alternatives have diverse set of environmental impacts, involve finding new sources of funding, or would benefit different stakeholder groups. This is because economic measures distill very different direct performance measures into a final common measure of net economic change.
5. **Other Specialized Economic Analyses.** There are many other specialized planning activities conducted by state DOTs. Some recent examples include improvements to highway access for new industries (e.g. access management and ramp/interchange construction), toll road or HOV feasibility, public-private partnership, high-speed rail feasibility, access to maritime ports and airport ports, improvements to border crossing and international trade, benefit-cost analyses used in support of American Recovery and Reinvestment Act (ARRA) funding for Transportation Investment Generating Economic Recovery (TIGER) grants from the Federal government. These specialized applications may require specialized economic analysis that may leverage existing models or data, but may require some customized approach.

To provide example of how other state DOTs use economic analysis, the white paper authors interviewed a dozen state DOTs. The purpose was to assess how

other management, planning and economics staff apply economic analyses to each of the five tiers of planning activities. Table ES-1 summarizes the types of economic analyses conducted; whether a statewide transportation model is used to generate inputs for an economic analysis model; what type of economic engine the agency typically uses (i.e. typical tools are input-output models such as IMPLAN, RIMS II, TREDIS and REMI); the cost in terms of staff time, consultant time, and license fees; and any key partners that are leveraged by the DOT.

The summary results of the interviews are as follows:

- The most common form of economic analysis conducted was at the strategic planning/program level. Many states such as Michigan, Florida, Missouri, and Kansas have launched regular program-level economic analyses on a regular basis in conjunction with a five-year workplan.
- Some states such as Kansas, Minnesota, and North Carolina have successfully used TREDIS as the underlying economic engine to prioritize projects based on macroeconomic impacts. Each DOT expressed satisfaction in the level of support provided. A key benefit was the on-line format of the tool to allow regions to also view and review analyses to avoid the "black box" effect.
- Due to the last round of stimulus funding, several states have utilized benefit-cost analysis for their TIGER applications. One state DOT expressed value in the fact that TREDIS had a module for this very purpose.
- About one-half of the interviewed DOTs used their statewide transportation model to provide inputs to the economic model. However, for many, this statewide model also was coupled with data from regional MPO models, which may have inconsistent data.
- Many states used REMI or TREDIS as their main economic engine to provide economic output results, although internal B-C tools and off-model spreadsheets also were very popular. Montana and Georgia both used HEAT, which was able to provide a comprehensive economic analysis package for strategic planning and project prioritization.
- There was a wide range in the resources spent by DOTs to conduct economic analysis. Some states such as Michigan and Wisconsin do a significant amount of analysis in-house; whereas, Florida, Texas, and Montana request significant consultant support. DOTs such as Michigan and Minnesota have benefitted from universities that have had licenses to the same REMI model, and can either validate results or provide peer support for analysis. Wisconsin DOT is unique in that it helps other state agencies perform economic analysis because they are the statewide experts in economic impact analysis.
- The strongest collaborative partners include local universities, state chambers of commerce, and state economic development corporations.

Table ES-1 Summaries of Economic Analyses Conducted at Interviewed DOTs

State	Types of Economic Analyses Conducted					Statewide Model Used	Economic Engine	Cost (Staff/Tool)	Key Partner
	To Determine Amount of Investment	Strategic Planning/ Program Level	Project Prioritization	Corridor/ Alternatives Analyses	Other (Ad-Hoc, TIGER, etc.)				
Michigan	●	●				Yes	REMI	2-4 staff; $55K annual license	University of Michigan
Florida	●	●		●	●	No	REMI	1 staff; consultant fees	Florida Economic Development (Seaport, Chamber of Commerce, etc.)
Missouri		●		●	●	No	REMI, TREDIS for I-70 Study	Consultant fees	Missouri Department of Economic Development
Indiana	●	●	●		●	Yes	MCIBAS, REMI	Consultant fees; $11K annual license	Indiana Economic Development Corporation
Texas		●		●	●	Yes	TREDIS, PEET	1 staff; consultant fees; license fees	Texas Transportation Institute, state universities
Minnesota	●	●	●		●	No	Minnesota DOT's own benefit-cost tool, TREDIS for TIGER, REMI at state level	1-2 staff; consultant fees	University of Minnesota, Minnesota Department of Employment and Economic Development
Georgia		●	●			Yes	Georgia HEAT	Up to 4 staff; consultant fees	Atlanta Regional Commission
Montana				●	●	No	Montana HEAT, REMI	1 staff; $19K annual license	University of Montana Bureau of Business and Economic Research
Kansas	●		●			No	TREDIS	3-4 staff; license	Large stakeholder group (included Chamber of Commerce, MPOs, cities, and counties, etc.)
West Virginia			●		●	No	B/C Tool	1 staff	TBD
North Carolina	●	●	●		●	No	TREDIS	3+ staff, license	North Carolina Department of Commerce
Wisconsin	●	●	●	●	●	Yes	REMI, IMPLAN, TREDIS	3-4 staff; approx $50K in annual licenses	Wisconsin Department of Commerce

- Policy Perspective: Economic analysis helps identify overall investment levels needed to meet transportation needs and allows decision-makers to devote resources to their best uses (in terms of maximizing benefits to the public and their customers.)
- Strategic Planning/Program level: Economic analysis helps analyze performance data and tradeoffs when allocating departmental resources among programs.
- Project Prioritization: Economic analyses helps screen alternatives to identify the level of cost-effectiveness and return on investment and to assess risks associated with project delivery.
- Corridor/Alternatives Analysis: Economic development impacts as a factor in determining key economic corridors. Some economic analysis is used in selecting between alternatives in an environmental process.
- Other (Ad-Hoc, TIGER, etc): Economic analyses for development projects, in support of ARRA funds or TIGER grants, or modal studies.

1.0 White Paper Introduction

1.1 WHY IS THIS STUDY BEING PERFORMED?

Idaho Transportation Department (ITD) has a new goal to "*Provide a mobility-focused transportation system that drives economic opportunity*." This means that ITD planners will have to communicate how the gross state product (GSP) of Idaho is linked to the State's transportation system.

Because improving and maintaining Idaho's infrastructure is a key component of Governor C.L. "Butch" Otter's vision to strengthen and diversify the State's economy through his Project 60 Initiative, it is imperative that the agency begins considering systematizing economic analysis within ITD.

Several economic analysis workshops were conducted with ITD executive and technical staff to discuss applications, methodologies, benefits, and issues regarding economic impact analysis for transportation. These workshops explored the types of projects and decision-making for which ITD may choose to use economic analysis. The workshops included presentations on economic impact analysis more broadly (project and program level, by mode, models, performance measures); and specifically related to the software tool Transportation Economic Development Impact System (TREDIS), which ITD has purchased.

Prior, during, and after the workshop, participants will benefit from understanding the experience of other states with respect to the development and uses of economic analysis. This white paper supplies workshop participants with background information to support more productive discussions at the workshop and additional material for post-workshop contemplation.

1.2 WHITE PAPER OUTLINE

This white paper summarizes current economic analysis practices in other state DOTs or major metropolitan planning organizations (MPO), with a focus on agencies that use TREDIS.

The remainder of the white paper is organized in the following manner:

- **Section 2.0, Overview of Economic Analysis in Transportation Planning** summarizes current economic analysis practices in comparable state DOTs, providing a literature review summary of recent survey assessments of state transportation agencies conducted by American Association of State Highway and Transportation Officials (AASHTO), the Urban Transportation Monitor, Transportation Research Board (TRB), National Cooperative

Highway Research Program (NCHRP), and Strategic Highway Research Program (SHRP) programs to synthesize economic analysis activities at state transportation agencies.

- **Section 3.0, Experience or Application from Peer State DOTs** takes the knowledge from Section 2.0 and interviews lead economists or planners working on economic analysis in 12 agencies to obtain information about the following:
  - Agency goals and policies that drive economic analysis and travel demand modeling;
  - Current tools (i.e., name and type of economic model, cost of model, number of staff needed to operate the system and time in use);
  - Data used to feed into the economic model (i.e., linkages with other tools or travel demand model);
  - Performance measures for economic impact; and
  - How economic information is communicated to citizens and elected officials.

  The section summarizes technical tools and data used at each agency, staff training activities, steps followed to implement economic analysis, and ways in which economic analysis results are used by agency decision-makers.
- **Section 4.0, Lessons Learned for Idaho** then provides a synthesis of lessons learned that can be applied to ITD as it embarks on conducting economic analysis within the agency.

2.0 Overview of Economic Analysis in Transportation Planning

State DOTs conduct economic analyses for a variety of decision-making needs at the state level, but also in support of state, regional, and local partners. These studies provide projected outputs that help analysts, planners, decision-makers, and members of the public better understand the link between transportation investments and economic growth. Many states are able to patch together existing internal models to generate estimates of direct user and nonuser benefits for economic analysis, but some use more sophisticated statewide travel models, which also may assign commodity flows to their roadway networks. Economic analysis then takes these direct measures of performance and feed them into economic analysis tools. The most-widely used of these input-output based economic analysis tools include the four below:

- IMPLAN (i.e. IMpact analysis for PLANning) developed by MIG, Inc.;
- RIMS II (i.e. Regional Input-Output Modeling System) developed by the U.S. Bureau of Economic Analysis);
- TREDIS (i.e. Transportation Economic Development Impact System) developed by EDR Group; and
- REMI Policy Insight (i.e. Regional Economic Models, Inc) developed by Regional Economic Models, Inc.

2.1 Overview of Applications of Economic Analysis

A review of literature over the last several decades shows that there has been increasing interest in state DOTs to communicate how transportation infrastructure investment leads to economic impacts, and burgeoning tools and frameworks for calculating these impacts. At the same time, politicians and legislators also are encouraged to defend expansion projects by listing the jobs and economic benefit it will bring to the region.

Transportation projects produce economic development when they induce permanent increases in employment, wages, and/or business output. Thus, state DOTs are realizing the value of analysis to justify projects included in short- and long-term plans. An analysis of economic development impacts does not necessarily need to be complex or costly; in many situations, relatively quick and

simple methods can often provide at least a general sense of the economic development potential of alternative projects or corridors considered for investment. Nevertheless, most robust economic analysis involves using one of a few economic modeling software packages. The most common economic engines are input/output (I/O) tables (RIMS II and IMPLAN), or models that apply I/O with other econometric functionality (e.g., TREDIS and REMI). Each of these requires significant amounts of data and knowledge, which often must be derived from a travel demand models, commodity flow data, and other complicated data sources and models. To assert these models are black boxes misses the point. Economic analysis requires significant mathematics and complicated theory, so it will not be transparent to most transportation practitioners.

Economic analysis may be useful at each level of a hierarchy of DOT planning activities, beginning with the most global decisions, such as how much spending on all types of transportation infrastructure and services is optimal, down to which project should be built first and what model and alignment will generate the most economic benefits. In order to understand how economic analysis may apply at each level of a planning hierarchy, however, we must first define these levels as a typology of planning activities. While there are multiple valid typologies, we suggest the following five:

1. Economic Analyses to Determine Amount of Investment

At the highest level of policy debate, economic analysis helps to determine the optimal amount of investment needed to meet transportation needs versus either more public spending for other public services (e.g., education, health care, public safety, etc.); or lower taxes to stimulate more private consumption.

The demand for economic analysis at this level may be motivated by one or more of three objectives: The first comes from the state's executive or legislature who demand that state government catalyzes economic growth by increasing transportation investments. The second objective involves the need to reverse declining or stagnant revenues that are forcing tough cuts to state services. Economic analysis provides some rationale for making tough choices about which state services may be cut with minimal disruption to the state's economic growth. Finally, the need to raise state revenues, either to fund multiple state services or for transportation exclusively. This objective must overcome voter skepticism that raising taxes will do more harm to the economy than the benefits derived from increased investment.

At this level, economic analysis must demonstrate causality between increasing transportation spending and achieving the stated objective, so the design and execution of the economic analysis must tell a compelling story. Often, but not always, a sketch-level analysis can provide a narrative that links the higher levels of transportation investment to the increases in business outputs, hiring, or personal income. Credible economic logic can be sufficient to illustrate the magnitude of potential benefits from increased spending.

2. Economic Analyses at a Strategic Planning or Programming Level

For the strategic plan level, often for a 10- or 20-year strategic plan, economic analysis helps compare the potential performance and tradeoffs between different allocations between programs, such as capital expansion, operational efficiency, maintenance and preservation, safety, etc.

Frequently, a state DOT will conduct an economic analysis on alternative scenarios, where each scenario includes different budget amounts and spending priorities (i.e., preservation versus capacity expansion, highway versus transit). The net economic consequences of each scenario are then compared to a no-project or business-as-usual (BAU) base-case scenario. Sometimes, DOTs will set targets for economic performance, and alternative scenarios are compared against absolute goals. Although setting absolute goals can provide broad public attention to economic performance, comparing the forecasted performance of alternative investment packages to one another and a BAU scenario is a worthwhile analytical endeavor. Business cycles and major disruptions are the norm, so proposing a package of transportation investments can support the state's economic growth within a much larger context of market forces and other types of pubic investments.

For these types of analyses, specific measures of economic performance often include changes in productivity, gross state or regional output (the value of goods and services), employment by type of industry, personal income, and attraction of new industries or firms. The economic impact model would then identify unique aspects of the economic base of an area, and show how that affects the distribution of benefits and the broader impacts on economic activities.

3. Economic Analyses for Project Prioritization

To inform project prioritization, economic analyses takes the direct benefits from alternative transportation projects or bundles of projects; and transforms these into changes in employment, income, and output (i.e., gross state or regional product). This transformation may seem like alchemy because these direct benefits, such as faster or more reliable travel time, fewer accidents, access to more workers or suppliers, or customers for businesses, are weighted by the volumes of travel, the value added and productivity of the affected industries, the competitiveness of the state's businesses, and work force compared to their counterparts in other states and increasingly throughout the world. When economic analysis takes all these complex interactions into account, the results may rank alternative investments differently than a ranking that applied the direct benefits.

Economic analysis may be used for project prioritization in combination with more traditional performance measures, such as cost-effectiveness and benefit-cost analysis (i.e., return on investment). Economic analyses may rank projects differently than conventional performance measures, such as travel time (congestion), equity, environmental impacts, safety, preservation, transit

ridership, and access to jobs. Such results may force policy-makers to reexamine their priorities and accept some difficult tradeoffs between economic growth, livability, and equity.

Several states do include economic development criteria in their project prioritization process. Economic development criteria can include expected job creation or retention, a measure of the severity of economic distress, the cost effectiveness of investment, and the level of private sector capital attracted to the state by the project. Rankings can be determined by an expert panel, quantitative rankings, or negotiated assessments between the state and the regions.

4. Economic Analyses to Support Corridor Planning or Alternatives Analysis

As part of an environmental process or as a preliminary corridor planning exercise, economic analysis can help evaluate the modal technologies, alignments, capital versus operational elements, or other differences between alternatives.

When a project enters more detailed planning, lead agencies will conduct alternatives analyses to ensure that modal and alignment alternatives are fully considered in project design. There is a technical comparison of the costs, benefits, and wider economic and environmental impacts of design alternatives. Frequently, there also is public input. A preferred alternative is then selected.

The consideration of economic impacts is only one part of the full process for assessing project design alternatives, although it can be an element within the purpose and need statement. Economic analysis can be particularly important as it provides a way to select and refine project design alternatives so that they can best support and enhance the competitiveness and growth of local economic activities (including commerce, industry, and job creation).

5. Other Specialized Economic Analyses

There also are many other types of economic analyses conducted by state DOTs. Some recent efforts include development, industry, or modally-focused economic impact analyses, benefit-cost analyses used in support of American Recovery and Reinvestment Act (ARRA) funding, as well as the required benefit-cost needed for Transportation Investment Generating Economic Recovery (TIGER) grants from the Federal government.

2.2 ECONOMIC IMPACT ANALYSIS TOOLS AT OTHER STATE DOTS

There is no standard approach to estimate the economic impacts associated with transportation projects among state DOTs in the U.S., either in terms of the method applied or the application of the results. Furthermore, states generally have not applied economic analysis of entire programs, but rather applied it for evaluating corridors or specific projects. The various approaches used by state DOTs to apply economic impacts analysis are described below.

Multi-attribute Scoring/Ranking/Prioritizing System

Economic development criteria are identified and account for a certain percentage of the maximum score of a project. An expert panel usually assigns points to the various projects as opposed to conducting a quantitative modeling exercise. Iowa, Ohio, and Kansas follow this approach for their local economic development enhancement programs.

This type of approach also is used to help define key corridors. The Minnesota Interregional Corridor Study and Wisconsin Translinks 21/Corridors 2020 Highway Plan are good examples of this approach. The focus is on using existing data regarding economic and traffic conditions, combined with local knowledge and trends, to define key access/connectivity facilities linking to economic markets.

North Carolina DOT uses the TREDIS software in its Project Prioritization 2.0 process. Staff use TREDIS to determine the economic competitiveness of a project. The primary input is the change in vehicle hours traveled (VHT) calculated from travel time savings. The output is percent change between a future no-project or BAU scenario and the alternative improvement. The actual measurements between a BAU and project scenarios include differences in the region's gross output (aggregate value of goods and services), jobs by industry, wages and income, and increased productivity.

Table 2.1 shows a summary of states using economic development criteria in prioritization.

Table 2.1 States Using Economic Development as a Decision Factor

State DOT	Use of Economic Development as Decision Factor in STIP
Alaska DOT	Uses economic development justification to select projects
Delaware DOT	Incorporated a set of objective supporting economic development policies
Idaho DOT	Planned several strategies to support economic development goals
Indiana DOT	Includes economic development as decision criteria from project to project basis
Iowa DOT	Uses expert panel to prioritize local economic development enhancement programs
Kansas DOT	Gives 20% weight to economic development enhancement in project selection
Maryland DOT	On project to project basis selects economic development projects and programs
Minnesota DOT	Uses economic development to help define corridors in interregional corridor study
Montana DOT	Adopted a series of policies and actions to support economic development
Nebraska DOT	Considers economic development just as one factor, along with many other factors, in its annual highway need assessment program.
Nevada DOT	Uses benefit-cost analysis and REMI models to consider the economic effect of highway projects
New Jersey DOT	Includes economic development as a category factor in selecting Federal Aid Highway projects

New Mexico DOT	Considers economic development factor in transportation projects selection process
North Carolina DOT	Uses economic competitiveness as a factor in project prioritization, comparing between a future no-project and project scenario
North Dakota DOT	Intends to engage local government and private sectors in examining and identifying collaborative economic development opportunities
Ohio DOT	Uses a scoring methodology to identify economic development projects
Rhode Island DOT	Considers economic impact as an important factor in selecting projects
Wisconsin DOT	Uses economic development to help define corridors in interregional corridor study

Source: Federal Highway Administration (FHWA), 2004, http://www.fhwa.dot.gov/planning/econdev/taskabjan30_3.htm; Cambridge Systematics 2012.

Surveys and Interviews

In this approach, the economic impacts of proposed projects are assessed through expert interviews, business surveys, the collection of vehicle origin-destination (O-D) data, and corridor inventory methods. In Indiana, for example, quantitative modeling of the economic development impacts of highway corridors is complemented by interviews with professionals and stakeholders. This is an approach that can be used in any analysis.

Often times, local surveys and interviews complement and provide context to more quantitative analyses (Indiana, North Country). But with any quantitative analysis technique based on valid statistical samples, talking with local groups about the expected economic impacts provided some ground-truthing. Nevertheless, interview, especially with businesses that perceive transportation improvements as a potential boost to their competitiveness or a lifeline for their survival, may overstate how they will leverage the proposed improvements. The most egregious bias voiced during interviews and outreach may be summarized as a "build it and they will come" attitude.

Comparable Case Studies

Case studies are used to identify the localized impacts of proposed projects by evaluating the experiences of other communities or regions that had completed similar transportation projects. Comparable case studies, particularly, are useful when presenting information to the public, because they often are easier to understand than detailed economic analyses. Unfortunately, case studies are almost purely anecdotal and do not replace or compare to a statistically valid survey and quantitative analysis.

Wisconsin and California use various methods to evaluate transportation projects and measure economic development impacts, including case studies, to determine the specific impacts of bypass projects. It typically is useful to consider how similar transportation investment projects influenced economic development in other places, and this approach is most commonly used for local economic development and corridor identification efforts. Care must be taken to

assess not only similarities, but also to understand the differences and document unique circumstances that could dominate the reasons for a particular outcome.

Checklist/Screening Tool

Some states have formal project priority formulas or ranking systems, which include either quantitative or qualitative factors related to economic development. Typically, economic development considerations are one of multiple factors that enter into the project selection process, and are given a weight relative to other factors, such as safety, time savings, etc.

The economic development impact or benefit often is rated based on a series of questions or concepts. For example, in Kansas, economic development is a key consideration of its "System Enhancement Program," a program designed to fund state highway projects that improve safety, relieve congestion, improve access, or enhance economic development. Some of the information applicants are asked to provide include the following:

- A description of economic trends in the impact area (most recent five-year trends showing change in jobs, jobs resulting from local firm expansions, jobs resulting from new companies or new locations, and the types of industries that created these jobs).
- A subjective assessment of how the requested highway project will strengthen the local economy; an explanation of additional infrastructure requirements that may be associated with the project and how they may be funded.
- A description of local economic development activities related to the requested highway project.
- A listing of anticipated economic impacts resulting from the project.
- A description of how existing businesses in the impact area would be affected by the project.

The valuation of each of these measures is determined by local experts who are familiar with the project and the local area. Applications for the System Enhancement Program are reviewed by a state-selected panel of economic development experts. Another example of the checklist/screening tool approach is used in Ohio.

Market Studies

These studies assess the current level of business activity in a given area to provide a basis for forecasting changes under different future scenarios. Market data and forecasting models are used to predict how proposed projects would change the size of the market and/or the cost of doing business in a specific area, impacting the area's relative competitiveness and future economic growth. A Maryland study to assess the strategic investment requirements associated with

emerging markets and technologies for the logistics and distribution industry is a type of market study.

Wisconsin also has a program, started in 1987 called the Transportation Economic Assistance (TEA), which provides state grants to public and private businesses, to help attract employers to Wisconsin and to help businesses remain and expand in the State, creating jobs and economic development. Economic analyses are conducted around 10 to 12 per year at the agency.

Regional Economic Simulation Models

User-benefit models are the traditional method of assessing the economic impacts of transportation investments. Nevertheless, they do not estimate impacts in terms of standard macroeconomic variables, such as employment, income, and GSP. Economic impact tools, often linked with user-benefit models, estimate impacts on these and other economic variables.

The key is that economic impact tools require precise calculations of the direct impacts of transportation investments, such as how travel time savings reduces the cost of doing business. Dynamic (REMI), transportation-specific (TREDIS), and static (IMPLAN and RIMS II) economic simulation models are examples of regional economic forecasting models.

Hybrid Modeling Systems

These systems are a combination of statewide modeling, internal benefit-cost tools, and an economic engine. Examples include:

- **Indiana DOT's Major Corridor Investment Benefit Analysis System (MCIBAS).** Indiana identified economic development as a key strategy with its 1986 statewide transportation plan, adding corridors in 1991. The Indiana DOT since has designed sophisticated economic analysis tools to assess the impacts of major corridor improvements. These impacts are evaluated using a suite of planning tools, including a statewide travel demand model, a user benefit-cost analysis tool, and a highway needs analysis tool. Results from these tools are then fed into an economic analysis tool that builds upon an Indiana-specific REMI model.
- **Montana Highway Economic Analysis Tool (HEAT).** The project integrated a statewide travel demand model, commodity flow database and forecast, a business attraction tool which has been integrated into TREDIS, and a benefit-cost module. These components were integrated into a desktop Geographic Information System (GIS) tool that could evaluate the economic benefits and costs of proposed highway projects, and develop and analyze several scenarios for highway reconfiguration options using HEAT. This led to the hiring of a dedicated economist on staff, some spin-off internal benefit-cost tools, and an internal tool called the preliminary estimating tool (PET) that uses average bid prices for selected roadway items and adjustment formulas based on project type-related assumptions.

- **FHWA's for use in its Highway Economic Requirements System – State Version (HERS-ST)** were used for most of the inputs calculating delay. However, Georgia DOT does have a statewide transportation demand model, and the 2035 Build and No-Build Statewide Model (SWM) trip table and networks were provided to the project team by Georgia DOT for the SSTP analysis. This model was used to determine the total congestion (travel-time) impact of roadway widening projects in areas of the State not covered by the Atlanta Regional Council MPO model, and where HERS-ST could not be used because the proposed project was a pure new capacity project rather than a widening of an existing facility.
- **Georgia HEAT.** Georgia HEAT was developed previously by the project team to support the development of the 2005 to 2035 Georgia Statewide Transportation Plan. Macroeconomic benefits of a project were estimated using equations from Georgia. Georgia HEAT works by translating delay reduction into GSP, and then translating GSP into jobs. Using GSP, instead of jobs, removes one level of assumptions.

Pre-/Post-Case Studies

These studies typically gather before-and-after data on the localized development impacts attributed to transportation investments, and occasionally compare changes over time in that region with economic changes in other regions. The Wisconsin DOT has studied the statewide impacts of highway investments through a number of in-house research reports that correlated growth in business locations and tourism with investments in new highways, rehabilitation projects, and bypass routes. There have been at least two economic evaluations of the impact of the Appalachian Development Highways.

One used regression analysis to isolate the economic growth impact of construction roadways in the Appalachian region (by comparing economic growth to comparable locations not experiencing highway construction), while another study used the REMI model to simulate the impacts of the program over the past 25 years and assess potential future impacts. The regression analysis study found that Appalachian counties with highway investments benefited from statistically significant higher economic growth than comparable counties outside the Appalachian area. The REMI model study indicates that roughly 16,000 new jobs accrued to the Appalachian region by 1995 due to travel efficiencies gained through highway investments, and that this corresponds to a 1.32 benefit-cost ratio.

Kansas DOT started looking at projects that had already been built to measure the economic impact pre- and post-development. Kansas DOT assembled a report on five case studies using an approach laid out by the FHWA to compare before and after project outcomes and assign a level of economic impact to the projects. They took a transportation project in one county and compared it to a peer county to look at whether the major transportation investment was a contributor to economic growth.

Sketch-Planning Tools

Another option to perform economic development impact analysis is to use a sketch-planning tool. Typically, this would be a more data-driven tool, relying on estimates of the relationship between transportation investments and economic activity. The term 'sketch' largely refers to the idea that the model may incorporate more unmodeled assumptions than a fully integrated traffic networked model/economic simulation model (which would take modeled user benefits to apply to the economic simulation model). The term 'planning' refers to the idea that the tool is designed to analyze many future alternative scenarios, using average relationships, with less project-specific information. One example would be to input approximate travel time savings, truck trips, and industries served into the sketch-planning tool, and then calculate economic benefits in terms of employment and sales.

Texas DOT built a revenue forecasting model sketch-planning tool called "TRENDS", with the objective of merging it with TREDIS in order to show the consequences of certain transportation investments.

2.3 KEY SUMMARIES OF LITERATURE

This section of the white paper summarizes recent assessments of state transportation agencies in the literature. A review of sources included research and surveys conducted by AASHTO, the Urban Transportation Monitor, TRB, NCHRP, and SHRP programs that synthesize economic analysis activities at state transportation agencies.

SHRP 2 C03 (2011)

This project, *Interactions between Transportation Capacity, Economic Systems, and Land Use* merged with *Integrating Economic Considerations Project Development*, was completed in 2011 and addresses the relationship between improved highway capacity and economic vitality. The main objectives included:

- Producing a resource that identifies the economic changes in an area in which a highway capacity improvement is made;
- Providing plentiful data (in the form of case studies) that planners can use to predict the impacts of a transportation project or group of projects; and
- Illustrating how these resources fit into the collaborative decision-making processes used when addressing capacity expansion projects.

The final product includes a database of 100 case studies describing existing highway capacity projects along with their economic development impacts. Methods include local interviews along with other data collection techniques. Attributes include pre- and post-project economic and land development data. The case studies are organized by project type and setting and are accessible via

a web-based tool called "T-PICS" (Transportation Project Impact Case Studies): http://transportationforcommunities.com/t-pics/.

While this report does not provide a survey about best practices among state DOTs with regard to economic analysis of transportation projects, this tool provides valuable information about specific measures a state DOT could use to evaluate projects. The final report is located at the following address: http://www.edrgroup.com/pdf/SHRPC03FinalReport.pdf.

Urban Transportation Monitor Survey (2010)

The *Urban Transportation Monitor (UTM)* conducted a survey entitled, *Evaluation and Prioritization of Transportation Projects*, in October 2010. UTM e-mailed this survey to more than 400 transportation professionals in cities, counties, state DOTs, and transit agencies; and received responses from 36 organizations (nine-percent return rate). The survey asked for information about evaluation and prioritization techniques used by various transportation agencies. While this survey did not focus only on state DOTs, the Kansas DOT submitted a noteworthy response highlighting its three-pronged approach to evaluating expansion projects that were identified as regional priorities. The three categories used in Kansas DOT's analysis were economic, engineering, and local consultation/stakeholder. The survey findings include a bulleted list of comments in response to a question about public involvement in prioritization processes, and a table containing agency responses organized by evaluation/ prioritization technique, along with the type of agency that submitted each comment. Survey results are included in UTM's November 8, 2010 issue (Volume 24, Number 9).

NCHRP Project 8-36, Task 60, A Guide to State DOT Consideration of Economic Development Potential in Planning NCHRP Project 8-36, Task 60 (2007)

This guide seeks to assist state DOTs in understanding the relevance of economic development in relation to their planning activities, and assessing the potential economic development benefits of their actions. The guide explains economic development concepts as they relate to transportation improvements. It also describes the promotion of economic development as a public policy goal, and summarizes the current state of involvement of state DOTs in economic development.

Findings include the following from a sampling of DOTs:

- Seventeen DOTs coordinate activities with the state or regional economic development agencies.
- Most interaction with other state agencies is informal, however. Many DOTs rely on their routine interaction with MPOs and regional planning organizations to coordinate economic development-related actions.

- Eleven DOTs use economic development as formal criteria in investment decisions. Economic development potential is often assessed qualitatively, although a few states use numeric scoring of economic development potential.
- Twenty state DOTs dedicate funding to promote economic development.
- Eight state DOTs conduct quantitative evaluations of economic development potential of projects, and at least five states have conducted post-implementation evaluations of economic development impacts.

Because the intended audience is state DOTs, this document focuses primarily on highway improvements, although many of the concepts and techniques apply to other modes as well. The final report can be found at the following location: http://statewideplanning.org/wp-content/uploads/62_NCHRP8-36-60.pdf.

FHWA Study of the National Scope and Potential for Improvement of State Economic Development Highway Programs, Tasks A-B Report (2004)

The purpose of this study is to provide a better understanding of the scope of highway-related economic development being undertaken by state transportation agencies, and to consider whether national guidelines could benefit the public by making such programs better. This report accordingly summarizes the nature of the highway-related economic development programs funded by U.S. states, and the level of total dollar funding for these programs being undertaken by state transportation departments during fiscal year (FY) 2001 to 2002. As of the publishing of this report, 17 state DOTs either had or were working toward a formal economic development highway policy.

Table 2.2 provides a summary of current state DOT approaches to promoting economic development and a survey of questions for all 50 state DOTs.

The final report can be found at the following location: http://www.fhwa.dot.gov/planning/econdev/taskabjan30.htm.

Table 2.2 Current State DOT Approaches to Promoting Economic Development (ED)

State	DOT Coordinates with External ED Efforts?	ED Goals as Formal Investment Criteria?	Separate Funding for ED Projects?	Separate Funding for ED Areas?	ED Evaluations for Proposed Projects?	Post-Project Evaluations of ED?
Alaska	–	Yes	–	–	–	–
Alabama	–	–	Yes	–	–	–
Arizona	Yes	Yes	Yes	No	–	–
Colorado	No	No	No	No	No	No
Delaware	Yes	Yes	–	–	–	–
Florida	Yes	Yes	Yes	Yes	No	–
Idaho	–	Yes	–	–	–	–
Indiana	–	Yes	–	–	–	–
Iowa	Yes	No	Yes	No	No	Yes
Illinois	–	–	Yes	–	–	–
Kansas	Yes	No	Yes	No	No	No
Kentucky	Yes	No	Yes	No	No	No
Maine	No	Yes	No	No	No	No
Maryland	Yes	No	No	No	No	No
Michigan	Yes	–	Yes	No	Yes	–
Missouri	Yes	Yes	Yes	No	Yes	Yes
Montana	Yes	No	No	–	Yes	–
Nebraska	Yes	No	No	No	No	No
New Jersey	No	No	No	No	No	No
New York	Yes	No	Yes	No	Yes	Yes
North Carolina	No	No	No	Yes	No	No
Ohio	No	Yes	No	Yes	Yes	No
Oklahoma	–	–	Yes	–	–	–
Oregon	Yes	Yes	Yes	No	Yes	Yes
Pennsylvania	Yes	–	Yes	–	–	–
South Carolina	Yes	–	Yes	–	–	–
South Dakota	–	–	Yes	Yes	–	–
Tennessee	–	–	Yes	–	–	–
Utah	No	No	No	No	Yes	No
Washington	Yes	No	Yes	–	–	–
West Virginia	–	–	Yes	–	–	–
Wisconsin	Yes	Yes	Yes	No	Yes	Yes
Wyoming	–	–	Yes	–	–	–
Total Data Points	23	23	29	19	18	15
Total "Yes"	17	11	20	4	8	5

– Denotes no information available.

Source: Survey conducted as part of this project combined with results from other literature, most notably Weisbrod, Glen, and Manisha Grupta, *Study of the National Scope and Potential for Improvement of State Economic Development Highway Programs: Overview of State Economic Development Highway Programs* (Task A-B Report), prepared for the Federal Highway Administration, March 2005.

NCHRP Synthesis Report 290 (2000)

This report, published in 2000, provides a state-of-the-practice update with regard to the assessment of economic development impacts of transportation investments. The following elements are included in this study:

- Literature review and summaries of economic development concepts;
- "State of Analysis Methods", including a review of measurement methods with examples illustrating methods used by transportation agencies;
- Findings from a survey questionnaire sent to transportation planning agencies in the United States, Canada, and select other countries that solicited information about current research and practice; and
- Needs for improvement in economic development analysis.

Survey responses were received from 36 states, seven Canadian provinces, eight MPOs, and Great Britain. One key concept discussed in the report is the relationship between economic development impact analysis and traditional measures of user benefit. Additionally, survey results illustrated that agencies measure economic development impacts for many reasons and use a variety of measures to do so. Of the specific measures used to assess economic development impacts, jobs and employment were the most common measures.

Additionally, many agencies apply this type of analysis to assess transportation projects in special cases rather than as a standard procedure. With regard to conclusions, many agencies were concerned about the inconsistent methods used to analyze the economic development impacts within transportation. Future needs identified in the report include further research to clarify the connection between transportation projects and economic development impacts, improved analysis tools, more accessible data, improved staff training, and consistent methods for assessing the economic development impacts of transportation projects. The report may be found at the following location: http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_290.pdf.[1]

[1] The link provided above is a scanned version of NCHRP Synthesis Report 290. However, due to the poor quality of the scanned version, a link to an earlier version of the report is provided here: http://www.edrgroup.com/pdf/synth290.pdf. This report was produced by Economic Development Research Group (EDRG), and was later published as the NCHRP Synthesis Report 290. The majority of the text in both reports is the same. However, the Acknowledgments and Summary section in the EDRG report differ from the front matter in the NCHRP report. Additionally, the EDRG report contains two additional appendices: "Summary of Responses and Experience by State", and "Listing of Economic Development Impact Studies."

2.4 REFERENCES

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3. National Cooperative Highway Research Program, 2000, *Synthesis 290: Current Practices for Assessing Economic Development Impacts from Transportation Investments: A Synthesis of Highway Practice*, accessed April 2012 from http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_290.pdf.
4. National Cooperative Highway Research Program Project 8-36, Task 60, 2007, *A Guide to State DOT Consideration of Economic Development Potential in Planning* final report, prepared by ICF International and the American Association of State Highway and Transportation Officials.
5. Transportation Research Board, 2007, *Development of Improved Economic Analysis Tools Based on Recommendations* from Project C03, abstract for Research in Progress with start date of March 9, 2010, and status of "proposed", accessed April 2012 from http://rip.trb.org/browse/dproject.asp?n=16658.
6. Urban Transportation Monitor, 2010, *Survey 1: Evaluation and Prioritization of Transportation Projects*, November 8, 24(9), pp. 15-19.

3.0 Experience or Application from Peer State DOTs

Based on the findings of the literature review, lead economists or planners conducting economic analysis at key state DOTs and planning organizations were identified for interviews to obtain information about the following:

- Agency goals and policies that drive economic analysis and travel demand modeling;
- Current tools (i.e., name and type of economic model, cost of model, number of staff needed to operate the system, and time in use);
- Data used to feed into the economic model (i.e., linkages with other tools or travel demand model);
- Performance measures for economic impact; and
- How economic information is communicated to citizens and elected officials.

Efforts were made to conduct interviews with a mix of policy and technical staff in order to provide more details on the impetus for applying economic analysis at the agency, as well as the challenges in technical implementation. This list of agencies also provides ITD a list of peer states for potential follow-up communication and continuing information exchange.

This section provides a state-by-state summary of economic analysis activity. Table 3.1 lists the twelve state DOTs reviewed for this white paper. Appendix A provides the interview guide of questions asked to interviewees. The following section (Section 4.0) provides a summary of lessons learned cutting across multiple agencies.

Table 3.1 Peer Agency Interviewees with Economic Analysis Experience

	Agency	Name	Role/Department
1	Michigan DOT	Susan Gorski Tim Ryan	Statewide & Urban Travel Analysis Section
2	Florida DOT	Mark Markovich	Senior Economic Analyst, Office of Policy and Planning
3	Missouri DOT	Machelle Watkins	Transportation Planning Director
4	Indiana DOT	Steve Smith	Principal Transportation Planner
5	Texas DOT	Ron Hagquist	Strategic Policy and Performance Management Office
6	Minnesota DOT	John Wilson Deanna Belden	Office of Capital Programs and Performance Measures
7	Georgia DOT	Tim Kassa	Planning Branch Chief, Statewide Research & Development Branch
8	Montana DOT	Hal Fossom	Planner, MDT Rail, Air Quality and Studies
9	Kansas DOT	Deb Miller David Schwartz	Bureau of Transportation Planning
10	West Virginia DOT	James Shaw	Econometrician
11	North Carolina DOT	Gene Conti	Secretary of Transportation
12	Wisconsin DOT	Dennis Leong Bob Russell	Division of Transportation Investment Management Transportation Economist

3.1 MICHIGAN DOT

Approach for Economic Analysis at the Agency

In 2004 to 2005, the Director of Michigan DOT wanted a tangible way to talk about the value of the transportation system to users and stakeholders. She initiated a project to help Michigan DOT calculate and communicate the benefits resulting from its annual highway investment in new construction, maintenance and rehabilitation, and safety programs. This resulted in a partnership between Michigan DOT and the University of Michigan's Institute of Labor and Industrial Relations who, in a series of five studies between 2005 and 2009, analyzed the travel-benefits of Michigan DOT's five-year highway plan (2005 to 2009, 2006 to 2010, 2007 to 2011, 2008 to 2012, and 2009 to 2013). The recent studies have been performed by Michigan DOT staff.

Researchers sought to evaluate the effect on Michigan's major industry sectors as well. Two sectors of particular interest were manufacturing and tourism. Researchers sought to derive the value of the jobs, GSP, and net personal income that could be directly or indirectly attributed to Michigan DOT's road and bridge programs.

The annual report has become a valuable tool that is highly anticipated and frequently used by the State Transportation Commission, the state legislature, and other key Michigan stakeholders.

The studies focus on measuring benefits, allowing Michigan DOT staff to make the decisions regarding benefits versus costs. As reported in the news media, Michigan Governor Jennifer M. Granholm welcomed the results of the study series, commenting that her administration's transportation priorities "further reinforce the connection between good roads and good jobs for Michigan."[2]

Specific Tools and Data Used at the Agency

The research team used a combination of economic analysis tools, featuring the REMI Policy Insight Model as a means of estimating the long-range implications for the state economy. The REMI model helped Michigan DOT quantify the economic benefit of its investment in the State's highway system, but also allowed the agency to establish a baseline process for performing its annual assessment of the State's highway program.

Michigan DOT has two REMI models (a single region and 84 regions). Annual maintenance is $55,000 per year for four users, with the initial model having a $250,000 purchase price.

In addition to REMI, Michigan DOT also developed a preprocessor for the economic analysis called the Michigan Benefit Estimation System for Transportation (MI BEST Tool), which takes inputs provided in terms of investment levels by project or program and combines it with information from Michigan DOT's Statewide Travel Demand Model (VHT, vehicle miles traveled (VMT)), to prepare and calculate the changes in appropriate policy variables for REMI model.

Finally, Michigan DOT does have a statewide model built on the TransCAD travel demand modeling software. For VMT and VHT, data is pulled from the statewide model and input into REMI for economic impact results.

Performance Measures

The aggregate economic impacts were measured in terms of various labor market indicators, such as changes in employment, labor force, unemployment, and GSP. This analysis produced economic results that showed the effects of transportation on household savings. For instance, Michigan DOT reported that from 2005 to 2009, improved road conditions saved households up to $57 million per year, with businesses realizing another $12 million to $35 million in annual

[2] Information from Michigan DOT research spotlight: http://www.michigan.gov/documents/mdot/MDOT_Research_Spotlight_Economic_Benefits_298421_7.pdf.

savings. Additionally, other macroeconomic results were provided. For instance, during 2005 to 2009, Michigan DOT's investment in the State's roads and bridges directly or indirectly created:

- 26,550 Michigan jobs;
- $4.2 billion in personal income; and
- $6.5 billion in gross state product.

Challenges in Implementation

In launching this work, there was a very steep learning curve to do economic analysis. It was important to hire an economist on staff (e.g., someone with a Master's degree in Economics). During the start of the analysis, Michigan DOT retained four dedicated staff to work on economic analysis within the agency, but at the moment, there are only two remaining (Sue Gorski and Tim Ryan). Over time, the management team has learned that there are high requirements for the level of work to be conducted in the preparation of data (i.e., pre-processing, post-processing, etc.).

One of the biggest challenges in technically communicating results was explaining to the management team that the results did not provide "jobs created", but "jobs supported."

Economic Analyses Reports

Michigan DOT produces an economic benefit report on the Five-Year Transportation Program, an integrated program that includes highways, bridges, public transit, rail, aviation, marine, and nonmotorized transportation. This began in the 2005 to 2009 Five-Year Highway Program. The latest published report is titled *Economic Benefits of the Michigan Department of Transportation's (DOT) FY 2010 to 2014 Highway Program Final Report (2010)*, and can be found at the following link: http://www.michigan.gov/documents/mdot/MDOT_economicbenefitreport_202828_7.pdf.

Another example of policy-level analysis was conducted to determine different levels of highway investment mixes from road-bridge rehabilitation and repair priorities, as compared to increased capacity/new roads investments. This was documented in *Evaluating the Economic Benefits to Michigan of Alternative Road-Bridge Investment Mixes (2008)*, and can be found at the following link: http://www.michigan.gov/documents/mdot/MDOT_Research_Report_RC1518_250377_7.pdf.

3.2 FLORIDA DOT

Approach for Economic Analysis at the Agency

About 13 years ago, the Florida DOT started a series of reports called the "Macro Reports", which estimate the economic benefits (benefit-cost framework) of the Departments' five-year work program. The catalyst for this series of studies (conducted in 2003, 2006, and 2009) is a Florida legislative requirement, passed in 2000, to analyze the macroeconomic implications of transportation investments, and to provide an understanding about how transportation impacts the State's competitive position. This study is required so "the State has a clear understanding of the economic consequences of transportation investments…." The agreed method for reaching this goal is to "develop a macroeconomic analysis of the linkages between transportation investment and economic performance." In response to this legislative mandate, Florida DOT has developed a macroeconomic analysis methodology to evaluate the long-term economic benefits of Florida DOT's Work Program. There was a deliberate policy not to conduct a benefit-cost ratio for each project.

In addition, Florida's Strategic Intermodal System (SIS) was established in 2003 by Florida's Legislature and Governor. The SIS is composed of a statewide network of high-priority transportation facilities and services, including the State's largest and most significant commercial service airports, spaceport, deepwater seaports, freight rail terminals, passenger rail and intercity bus terminals, rail corridors, waterways, and highways. The SIS is intended to enhance Florida's economic competitiveness by focusing limited state resources on those transportation facilities that are critical to Florida's economy and quality of life. The SIS Strategic Plan and the Guidance document both required Florida DOT to develop a project prioritization process to guide investment decisions. That process was to be driven by policy and supported by data through the SIS Investment Tool.

Finally, Florida also is working on a Return on Investment (ROI) study that considers project-level benefits and project-level ROI. Although in nascent stages, the objective is to develop a method to document, evaluate and estimate ROI for Florida DOT's multimodal and modal programs, projects, and policies.

Specific Tools and Data Used at the Agency

For the Macro Reports, economic impact was developed mostly using HERS model for transportation outcomes and the REMI model to translate the transportation outcomes into economic impacts in terms of effect on GSP going out 30 to 40 years. Although Florida DOT does have a functioning statewide transportation demand model, it was not used for this purpose as it would have been very data intensive and impractical.

The benefits of the five-year Work Program were compiled at the program level using a combination of program-level analysis tools (e.g., HERS, NBIAS) and

aggregated project impacts (e.g., for freight rail). REMI Insight was used to estimate the indirect and induced economic impacts of the Work Program investments within the State of Florida. The REMI model used in this study is a statewide model with 70 industry-sector detail; it is the same model used by the Florida Legislature.

Florida DOT does not maintain a REMI license at this time.

Performance Measures

The benefits attributable to the Florida DOT Work Program include the macroeconomic impacts measured by changes in real personal income, which result from improved transportation performance and the impact of these improvements on business productivity and expansion. In other words, investments reduce the cost of doing business for firms in Florida; and this increases employment growth, business sales, and personal income. Direct highway and transit user benefits for personal travel are included. Highway user benefits include the travel time savings, vehicle cost reductions, and accident cost reductions created by improved travel conditions.

Challenges in Implementation

Florida DOT realizes that there are many people within the organization at the staff and executive level that have not had experience with economic analysis; and in a period of budget cutbacks, people are not trying to take on more responsibility. In some cases, the project partners might be interested in conducting analysis on their own (i.e., if it's a project they are advocating), but Florida DOT is not sure this will be an objective analysis.

As of right now, some main challenges include moving beyond the transportation user benefits and improving on the safety, environmental, and nonmotorized mode data. There might be exercise benefits, for example, Florida DOT is not currently capturing. The theory of benefit-cost analysis is that it should be comprehensive from a social point of view, so all costs and benefits are considered and projected to a reasonable degree of accuracy. Florida DOT still needs to improve on this capability.

An issue arising on the SIS Investment Tool database is that the values for current and future traffic level and truck traffic level are provided by the seven Florida DOT districts. In the process of reconciling this data for the SIS, the consultant found some inconsistencies in the data; some districts may be putting in a general estimate for the proposed project, some might have used a demand model to generate the number, and some used growth factor. There was a lot of work required to process data for with and without project travel time estimates, VHD, and VMT on common terms. Florida DOT recommends incorporating time and resources for review and substantial quality assurance (QA)/quality control (QC), even when districts use the same methodology, because some

numbers may be generated through the MPOs or other parties and require reconciliation.

Economic Analyses Reports

Florida DOT Office of Policy Planning (OPP) conducts transportation-related economic analyses ranging from revenue forecasts to cost analyses to the Macro Reports of their five-year work program. They can be found here: http://www.dot.state.fl.us/planning/policy/economic/.

The latest "Macro Report" was conducted in 2009 entitled, *Economic Impacts of Florida's Transportation Investments: A Macroeconomic Analysis*. It is an analysis of the macroeconomic effects of program-level transportation investments at both the state and district level. Versions from 2003 and 2006 also are on-line. The 2009 report can be found here: http://www.dot.state.fl.us/planning/policy/economic/macroimpacts0909.pdf.

3.3 MISSOURI DOT

Approach for Economic Analysis at the Agency

The Missouri DOT, in an effort to find the most effective way to communicate the benefits of transportation projects to the public, began to incorporate economic analysis into the transportation planning process. Missouri DOT wanted to move beyond the traditional focus of project analysis including categories such as safety, travel time, and delay; the agency wanted to quantify the benefits in economic terms. This move toward incorporating economic analysis was a proactive one; it was not a reaction to public feedback. Eventually, this type of analysis became expected by the State's legislators.

Analysis was performed on the five-year Statewide Transportation Improvement Program (STIP), as well as on a few high-profile projects with significant cost such as the $535 million improvement in St. Louis, as well as the new Mississippi River Bridge, among others.

Specific Tools and Data Used at the Agency

Missouri DOT used REMI to conduct analysis in partnership with the Missouri Department of Economic Development (MDED). It was a mutually beneficial relationship; the MDED's expertise in the area of economic development made it more feasible for it to run the REMI model. Additionally, the fact that MDED conducted the transportation analysis helped Missouri DOT achieve its goal of conducting an objective analysis. The partnership is discussed in more detail in the implementation section of this summary.

With regard to other models, Missouri does not have a statewide transportation model. Any work with models is generally done with at the regional level, either with regional agency staff or consultants.

Missouri DOT produces cost estimations for projects. While many agencies can run into challenges in maintaining consistency in this area, Missouri generally does well in this area, estimating costs within a few percentage points of the actual costs, partly due to the fact that they running a shorter-term (five-year) planning program. The cost information is housed in a database incorporating all STIP information.

Performance Measures

Missouri DOT's general areas of interest include economic development, job creation, and safety. For the STIP, Missouri DOT produces a variety of economic indicators, including average and cumulative economic impact of the net general revenue, personal income, GSP, and economic output. Data is also generated by industry type.

Challenges in Implementation

One of the major themes in this conversation with Missouri DOT was value of the agency's solid partnership with the MDED. The agencies have had a mutually beneficial process in place for about the past 10 years. Missouri DOT compensates MDED for completing economic analysis on Missouri DOT's transportation projects, and Missouri DOT receives the data needed to help consider economics in its transportation investment analysis.

Another recurring theme was how to communicate what is on the horizon in transportation in the coming years. A nationwide trend is that the United States has a mature transportation system. While some people are not aware of this in their daily lives because the streets on which they travel might be in good condition, the need to keep the nation's transportation infrastructure in a state of good repair and focus on maintenance rather than new infrastructure projects is critical. Many agencies are faced with the challenge of communicating the importance of taking care of our current system to the general public. Missouri DOT's approach to this challenge is to first revise its long-range transportation plan (LRTP). Because economic development, job creation, and safety resonate well with people, the agency is focusing on trying to quantify effects in those areas. The agency is striving to find the best way to communicate the benefits of putting money into one investment over another.

The agency's main methods of communication with key stakeholder are through news releases and occasionally with public meetings, but in general, the public has not expressed significant interest in economic analysis.

Economic Analyses Reports

Missouri's STIP invests more than $4.5 billion in more than 980 transportation infrastructure projects across the State between FY 2012 to 2016. The STIP does summarize economic indicators, including employment, revenue, personal income, GSP, and economic output. The latest summary report can be found

here: http://www.modot.mo.gov/newsandinfo/documents/STIP2012-2016.pdf.

Missouri DOT also conducts several individual economic impact reports for a wide variety of projects. A list of these impact analyses can be found here: http://www.modot.mo.gov/newsandinfo/EconomicImpactAnalysis.htm.

3.4 INDIANA DOT

Approach for Economic Analysis at the Agency

The Indiana DOT has incorporated economic analysis into its transportation planning process since the 1980s. One catalyst for Indiana DOT to do economic analysis was Indiana's receipt of funding through the Federal appropriations bill in the late 1980s for the I-69/Corridor 18 project that required the cost-benefit analysis for the interstate.

In recent years, Indiana DOT has done more programmatic economic analysis on long-range plans, major corridor investments, multimodal freight studies, and various studies for economic development and commerce-related projects. The latter project types often are initiated from a mandate from the legislature. One particular plan, in which economic analysis played an important role, was the Major Moves plan, created in 2005 at the request of Governor Mitch Daniels. It is a 10-year transportation plan that aims to improve and expand the State's highway infrastructure. A total of $2.6 billion was committed to the plan.

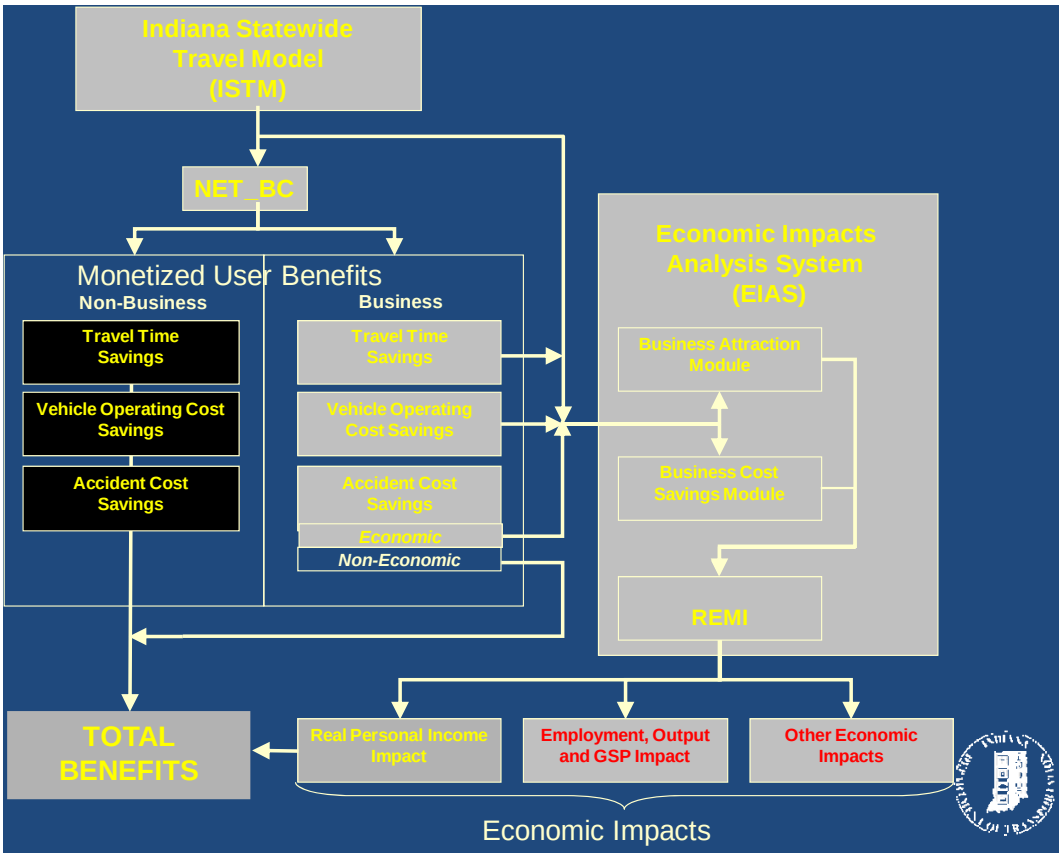
Specific Tools and Data Used at the Agency

Indiana DOT uses outputs from its statewide travel demand model in coordination with REMI, for which the agency has a subscription. Indiana DOT also incorporates commodity flow data into the model in the form of freight truck trips. There is no network assignment in the model. Figure 3.1 shows the process in which the economic analysis is conceptualized for the long-range plan.

Indiana DOT takes an asset management approach to cost estimation, in which the agency estimates costs using a consultant-developed spreadsheet tool based on equations from HERS.

Additionally, in 1999, Indiana DOT hired a consultant team, including the Economic Development Research Group (EDRG), to incorporate the impacts of major highway projects on regional economies. As part of this project, a process to find out regional effects in addition to the traditional highway user benefits and costs, as well as a tool called MCIBAS. This system includes the following components:

Figure 3.1 Economic Analysis Methodology at Indiana DOT



Source: Economic Impacts of Indiana's Statewide LRTP, PowerPoint from Steve Smith.

1. The statewide travel demand model, which is a TransCAD-based model;
2. NET_BC, which translates the traffic effects from the statewide model into the user benefits; and
3. Economic Impact Analysis System (EIAS), which estimates the economic impacts of highway projects.[3]

One problem with this tool is its complexity; the agency no longer uses NET_BC because it is not very accessible to most users. It has started to use the Cal-B/C tool, which completes a similar function, but has a more user-friendly interface. A lot of the information from NET_BC was transferred to Cal-B/C. One challenge with Cal-B/C is that it is a visual basic-based tool; whereas, the Department would like to move to a spreadsheet-based tool.

[3] Economic Development Research Group, "Indiana's Major Corridor Investment-Benefit Analysis," accessed May 5, 2012, from http://www.edrgroup.com/library/highways/indianas-major-corridor-investment-benefit-analysis-system.html.

Performance Measures

The MCIBAS tool produces both measures of user benefits, as well as the GSP and employment measures. Indiana DOT is able to conduct analysis for multiple corridors to find out the economic viability of the projects under consideration. The benefit-cost component measures user benefits, such as travel time, safety, and vehicle operation.

The economic modeling component of the system measures business costs and productivity, changes in customers and labor markets (based on changes in travel time), and incorporates business attraction. This helps project the types of industries that might be attracted to a particular area due to highway improvements. Tourist-related impacts also are calculated.

Secondary economic benefits also are calculated in the form of regional employment, income, and output. These various impacts are then aggregated and an overall project benefit-cost ratio is determined.

Challenges in Implementation

Indiana DOT is generally satisfied with its economic analysis process, highlighting its positive relationship with the State's economic development corporation and the tools it uses. However, at times, conflict between the agencies can arise due to differences in each organization's objectives. The economic development corporation is business-oriented so it is not always interested in participating in transportation studies conducted by Indiana DOT; it is focused on short-term, project-specific work. Indiana DOT respects the economic development corporation's orientation, however, and tries to limit its requests for help with transportation studies.

While the agency is comfortable with its current economic analysis processes, it took some time to reach that level. When the agency was first using REMI, there was a staff member with an economics background who was able to work with the tool, but generally, the work with REMI was done by consultants. Similarly, while the MCIBAS tool is helpful, the Net-B/C portion of the tool was not user-friendly. That did pose a problem, which is why Indiana DOT looked for and has started using Cal–B/C, a tool that can more easily be used by agency staff. The agency is satisfied with the data it is able to incorporate into its analysis.

Economic Analyses Reports

The Economic Impacts of Indiana's Statewide LRTP document summarizes in detail the economic analysis methodology, as well as costs of investments in the long-range plan, user benefits, economic impacts, and the overall long-range plan benefit. The article is located here: http://www.in.gov/indot/files/EIreport.pdf.

The following summary article was written about the MCIBAS tool: http://www.edrgroup.com/pdf/mcibas.pdf.

3.5 TEXAS DOT

Approach for Economic Analysis at the Agency

The Texas DOT's approach to economic analysis has been largely ad-hoc. Over the last several years, economic analysis has been performed on major corridor improvements and in preparation for the second round of TIGER grants. Additionally, a report completed by the Texas Transportation Institute and Texas Transportation Research "It's About Time: Investing in Transportation to Keep Texas Economically Competitive" projects to the year 2035 and used economic analysis to show the effect of investments in the transportation system.

Other economic analysis includes a research effort conducted by Texas DOT and the Texas university research centers beginning in 2005. These results are summarized in a report entitled "A Metastudy of Transportation Investment in the Texas Economy." This report incorporates six case studies that used models to analyze the economic impacts of a number of transportation expansion projects – some existing and some proposed – throughout Texas. The impetus for these studies was the growing difference between the addition of road capacity and an increase in traffic; the number of road users was beginning to greatly outweigh road capacity increases. While each case study looked at different projects, the general finding was that road delay is very costly, and that transportation investments have a high rate of return, at approximately 25 percent[4].

One important contextual note is that, due to the nature of the dwindling transportation funding for state DOTs, Texas DOT has been devoting a large percentage of resources to maintenance over the past few years; while the construction projects that have already received funding are being completed, few new construction projects are being funded.

Specific Tools and Data Used at the Agency

Texas has a statewide travel demand model, as well as a freight model, but Texas DOT does not use outputs from its model in economic analysis. The State built a revenue forecasting model called "TRENDS" with the objective of merging it with TREDIS in order to show the consequences of certain transportation investments. Texas DOT also has used REMI, but does not maintain a license for the tool.

Another tool that Texas DOT uses is called Project Economic Evaluation Tool (PEET) to conduct economic analysis, which is a sketch-planning tool that is

[4] This figured was cited in the report entitled "Shaping the Competitive Advantage of Texas Metropolitan Regions," produced by the Governor's Business Council in September 2006.

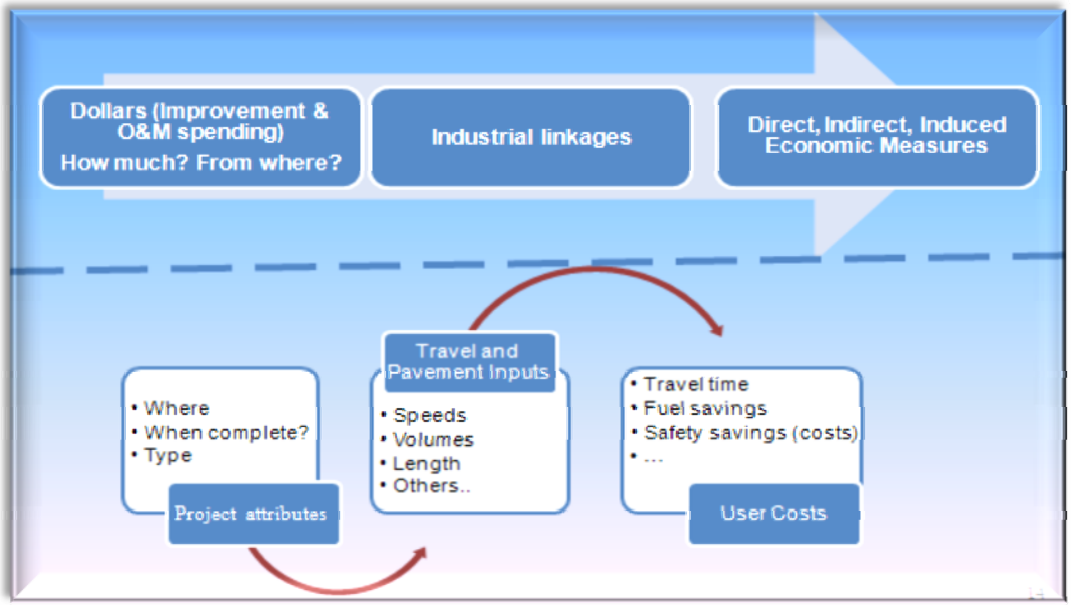
much simpler than REMI, but more sophisticated than a "back-of-the-envelope" calculation.

Figures 3.2 and 3.3 show screenshots from PEET. Figure 3.2 shows a diagram of PEET's process flow, and Figure 3.3 shows PEET's easy-to-use interface. Figure 3.3 illustrates that the tool can provide analysis for different project types, and provide results on the project level or on an aggregate level. One of the main objectives of this tool, created by Texas Transportation Institute, was to provide enough detail to show differentiation between similar projects in different geographic locations. In terms of inputs, this model is tailored around SIC codes. This tool was used for the TIGER grant process, but has not been used much since then.

Texas DOT also expressed interest in the tool called T-PICS[5], which was recently developed as part of the SHRP 2 research project, consisting of numerous case studies and projects in which economic analysis was used to evaluate transportation investments.

Finally, Texas DOT has recently embarked upon a research project related to analysis tools. The main objective is to determine what types of analysis are useful, especially within the realm of cost-benefit analysis. Another objective is to produce tools that are accessible to DOT staff members. One aspect of this research is the adaptation of a transit model for use at the MPO level.

Figure 3.2 PEET Process Diagram



Source: Texas Transportation Institute, 2009.

[5] http://transportationforcommunities.com/t-pics/.

Figure 3.3 PEET Interface

Source: Texas Transportation Institute, 2009.

Performance Measures

One of the major strengths of PEET is its simple interface and ability to use project-level data to provide quick estimates of metrics used in traditional benefit-cost analysis, including static analysis of dollar impacts, user effects such as time, safety, and fuel consumption, as well as local impact measures.

"A Metastudy of Transportation Investment in the Texas Economy" reviews the results of six case studies that used models to analyze the economic impacts of a number of transportation expansion projects – some existing and some proposed – throughout Texas. In these studies, the following performance measures were used: jobs (new); output; gross regional product; aggregate annual personal income increases; and time and fuel savings. As noted earlier, findings showed that transportation investments are worthwhile; and according to these studies, produce an average rate of return of 25 percent. The study highlights the example that implementing a $1 billion new capacity project one year earlier than planned would be worth $250 million. These case studies illustrate the cost of delay and support the idea of implementing projects ahead of schedule through creative financing.

Performance measures being investigated for the future in Texas DOT's ongoing research project include safety and congestion relief benefits.

Challenges in Implementation

Texas DOT highlighted the importance of taking advantage of the universities and other research institutions to find out how best to conduct economic analysis and learn about the various resources and tools available in this area, particularly because the DOT does not have a lot of economic expertise in house.

Some of the greatest challenges lie ahead. One challenge includes providing accessible tools for staff to use. Another significant challenge is to figure out an effective way to communicate to the public and stakeholders the problems with the transportation system that are on the horizon. For example, the transportation infrastructure is aging and there is insufficient funding to meet the system's needs today and in the future. With little money, the Department has two main areas on which to focus: improving internal efficiency and improving the allocation formulas. To look at the latter, Texas DOT has assembled a group of economists to review the funding allocation formulas for accuracy. As other agencies have mentioned, Texas DOT seeks to find the best way to communicate the benefits of putting money into certain investments. Economic analysis and tools help make a case for putting money into particular investments.

Economic Analyses Reports

Texas DOT, in collaboration with consultants and the State's university research centers, produced a meta-study of transportation investment in the Texas economy that highlighted three types of studies that were completed in response to problem of growing congestion and its relationship with the transportation investments being made. This report can be obtained by request from Ron Hagquist at Texas DOT.

Three studies were conducted looking at aggregate highway spending in Texas.

1. **Economic Activity Generated by Texas DOT Authorized Spending, Cambridge Systematics Inc. (2006)** was to assess the economic impact of anticipated transportation expenditures, including the historical impact as a point of reference. The economic impacts measure the contributions to the statewide Texas economy in terms of jobs, income, and business output from transportation expenditures from 1996 to 2015.
2. **Potential Gains from More Efficient Spending on Texas Highways, Luskin and Mallard (2005)** was conducted to examine the effects of various levels of transportation spending in Texas. The findings "strongly suggest that Texas is under-invested in existing highways …that over the five years from 2000 through 2004, investing an additional $36 billion, or $7.2 billion a year, would have been economically efficient.
3. **Shaping the Competitive Advantage of Texas Metropolitan Regions, Governor's Business Council (2006)** examined the value of investment in meeting mobility needs in the metropolitan areas of the State. It explicitly estimated benefits accruing to five primary areas: a) the economic impact of the construction activity; b) savings from increased economic efficiencies as a result of improving mobility; c) the economic impact of the increase in economic efficiencies resulting from these lower costs; d) time savings to individuals as a function of reduced commute times and an increase in travel

speeds; and e) fuel savings to individuals as a result of more efficient fuel burn from lower congestion levels.

Finally, a report was published by the Texas 2030 Committee entitled "It's About Time: Investing in Transportation to Keep Texas Economically Competitive" and provides updated details about transportation challenges in Texas and the possible solutions to those challenges. The report was adopted by the Texas Transportation Commission on March 31, 2011. It can be found here: http://texas2030committee.tamu.edu/.

3.6 MINNESOTA DOT

Approach for Economic Analysis at the Agency

The Minnesota DOT has conducted benefit-cost analysis as part of its planning process since the late 1990s. The benefit-cost analysis is performed in the project development process PDP to analyze different alternatives for final selection of transportation investments. Only certain project types are subject to evaluation on the measure of cost effectiveness; these are specified in the agency's cost effectiveness policy.

The Minnesota DOT's long-range planning process also incorporates some macroeconomic measures and addresses questions, such as "what would happen (in economic terms) if we put an extra $X toward pavement preservation?" The agency's goals are encompassed in the following phrase: Safety, Mobility, Innovation, Leadership, and Transparency (SMILT).

Additionally, Minnesota DOT is just beginning a corridor investment process, in which the agency is conducting outreach to different geographic areas in order to initiate partnerships and working to coordinate the timing of projects in those particular corridors in order to give priority to a corridor, which supports economic development. The agency would like to create a common platform for evaluating these corridor projects, just as TIGER has a particular set of evaluation criteria on which competing states are scored when being considered for TIGER grants.

Specific Tools and Data Used at the Agency

Minnesota does not have a statewide model, so metro-area models are used in analysis. Minnesota DOT does not work with models directly; rather, it updates and maintains the values associated with economic metrics (e.g., standard values of time, average vehicle operating cost, and costs for various crash outcomes). Consultants complete the benefit-cost analysis for Minnesota DOT; training would be required in order to have staff complete the work. Two economists on staff review the analysis completed by the consultants and ensure that the guidelines are being followed and the project objectives are included.

TREDIS and REMI also have been used by the agency. During the second round of TIGER grants, for example, the agency received a free, trial subscription to TREDIS and appreciated the software's capabilities; it was a great help to staff when they were preparing the statewide unified TIGER application, which included many types of projects, such as transit, highway, and complete streets. The agency considered purchasing a TREDIS subscription, but determined that because of the agency's current economic analysis process and because the State does not have a travel demand model, many changes would need to take place within the agency in order to make the software purchase worthwhile.

The Minnesota Department of Employment and Economic Development (DEED) subscribes to REMI's Policy Insight Module, which allows them to evaluate policy questions outside transportation.

Minnesota DOT also has a close relationship with the University of Minnesota's Center for Transportation Studies (CTS), and they work together on economic analysis. Recently, Minnesota DOT and CTS have been asked to perform testing and validation on the T-PICS project, which is part of the SHRP 2 research program[6]. One of the benefits of T-PICS is its accessibility and ease of use; it helps DOTs answer some of the same questions as REMI or TREDIS, but it is easier to use. This opportunity to test the T-PICS program is helping Minnesota DOT become more familiar with this tool, which incorporates local and state government data along with labor statistics.

Performance Measures

Minnesota DOT uses the following performance measures in its benefit-cost analysis:

- Travel time benefits in the form of travel time savings;
- Vehicle operating benefits;
- Safety benefits; and
- Cost effectiveness, measured in either miles or dollars.

Challenges in Implementation

Trying to incorporate economic analysis tools that are effective and easy to use into Minnesota DOT's project prioritization process is challenging. The agency is comfortable with the benefit-cost analysis process that has been in place for many years, but it is looking for ways to analyze data in the way that sophisticated tools, such as REMI and TREDIS can, but through a more user-friendly system. Minnesota DOT would like to know how to move beyond benefit-cost. In a different, but related topic, Minnesota DOT is currently

[6] http://transportationforcommunities.com/t-pics/.

embarking upon a large asset management effort; it is a different aspect of economic analysis, but it is important, so they are also tackling that topic.

Another challenge relates to the assumptions behind the economic analysis. Some of the values used in the equations change over time. For example, the U.S. DOT updates its assumptions, such as the value of time. Minnesota DOT tries to update its values regularly as well, but also wants to maintain a reasonable progression over time, so it can be a difficult balance. The values and assumptions can have a great effect on how a project fares in terms of economic analysis. If one project were evaluated in a year in which the value of time changed dramatically; and the following year, a similar project were analyzed with a much different value of time and produce a much different result; that could be problematic and confusing to decision-makers and stakeholders.

Economic Analyses Reports

Minnesota DOT provides a clear explanation of its benefit-cost analysis process at the following location. It also provides an Excel-based worksheet that can be used to complete the analysis: http://www.dot.state.mn.us/planning/program/benefitcost.html.

3.7 GEORGIA DOT

Approach for Economic Analysis at the Agency

In 2007, Georgia DOT formally began taking official action in looking at economic measures and analysis. The lead-up to the recession and the overall financial climate set the impetus to look at economics factors when it came to programming, scheduling, and the agency's work program. There were limited fiscal resources and multiple resources competing for diminished dollars. Pursuit of more economics-focused performance measures used additional information to support decision-making, and not to "handcuff" the agency in any way.

As part of the Statewide Strategic Transportation Plan 2010 to 2030 (SSTP), the intent was to look at more than 900 projects falling into the following three main categories:

1. **Highway New Capacity Projects.** These projects include widening existing roadways and constructing entirely new roadways. They form a core part of Georgia DOT's work program. The primary objective of these projects is typically congestion reduction and improved connectivity.
2. **Economic Development Projects.** This category includes projects in the Governor's Road Improvement Program (GRIP). GRIP is intended to provide four-lane highway access to the Interstate System to communities across the State outside of the major metropolitan areas.

3. **Traffic Operations Projects.** These projects include Automated Traffic Management and Information Systems (ATMS/ATIS) projects and continuous center turn lanes.

Specific Tools and Data Used at the Agency

The FHWA's HERS-ST was used for most of the inputs calculating delay. However, Georgia DOT does have a statewide transportation demand model, and the 2035 Build and No-Build Statewide Model (SWM) trip table and networks were provided to the project team by Georgia DOT for the SSTP analysis. This model was used to determine the total congestion (travel-time) impact of roadway widening projects in areas of the State not covered by the Atlanta Regional Council MPO model, and where HERS-ST could not be used because the proposed project was a pure new capacity project rather than a widening of an existing facility.

Macroeconomic benefits of a project were estimated using equations from the Georgia HEAT, which was developed previously by the project team to support the development of the 2005 to 2035 Georgia Statewide Transportation Plan. It was adapted from an application first developed and applied by Cambridge Systematics in Montana, and subsequently in other states. Limitations in the application of Georgia HEAT for this project prioritization effort include the use of standard statewide default values for the allocation of benefits between Georgia and the rest of the United States, and a low level of confidence in truck volumes. Because of these limitations, the original measure of "increase in jobs" was replaced with "increase in GSP" as the economic development performance measure. This switch decreased the level of risk associated with the measure because it takes one step out of the calculation methodology. Georgia HEAT works by translating delay reduction into GSP, and then translating GSP into jobs. Using GSP instead of jobs removes one level of assumptions.

The equations in Georgia HEAT are a simplification of equations of changes in business output as a function of transportation cost. Those equations themselves were developed from REMI as used in Georgia. Georgia HEAT allocates GSP to regions of Georgia and the rest of the United States based on the percentage of that respective travel using a facility. That allocation of business benefits is based on the allocation of travel-time savings based on truck VHT throughout the system and a share of auto VHT savings based on business auto percents. For the prioritization tool, these regional allocation values are not available and standard defaults are used.

Performance Measures

Two of the 10 performance metrics chosen were related to Economic Growth. Figure 3.4 shows the performance management framework used for the SSTP. This is the primary goal of the Economic Development program category, but can be a secondary goal of new capacity projects as well. It is measured by the forecast change in GSP brought about by the reduction in congestion achieved by

the project, and whether the project is located in a county that is economically disadvantaged, as determined by state policy criteria.

The two main performance measures are as follows:

1. **Change in GSP**, which is calculated for each project in year 2035 based on VHT savings (from delay measure described above), using an equation developed with Georgia HEAT.
2. **Economic Development Policy Area**, which is determined based on the answer to the following question, "Is project located within an economic development policy area?" The answer to this question is yes, if the project is in a county that has a OneGeorgia classification of "eligible" and/or a Job Tax Credit Program classification of "Tier 1."

Figure 3.4 Performance Measurement Framework for Georgia DOT's SSTP

	SWTP Goals							
Program	Preservation	Safety	Congestion (70%)*	Connectivity Access and Mobility	Economic Growth	Total Score	Benefit / Cost	Other Factors
Roadway Capital Maintenance								
Roadway New Capacity	1. Structural Deficiency 2. PACES Rating	3. Crash Reduction (by severity)	4. Delay Reduction	5. Travel Time: Truck Route/ IM Conn./STRAHNET 6. Activity Center 7. Land Use Plan 8. Access Mgmt.	9. Gross State Product 10. Economic Development Policy Area		B/C	Deliverability, Funding Sources, Readiness, etc.
Roadway Traffic Operations		1. Crash Reduction (by severity)	2. Delay Reduction	3. Travel Time: Truck Route/ IM Conn./STRAHNET 4. Activity Center	5. Gross State Product 6. Economic Development Policy Area		B/C	Deliverability, Funding Sources, Readiness, etc.
Roadway Safety								
Transit								
Intermodal								
Demand Mgmt.								
Economic Development	1. Structural Deficiency 2. PACES Rating	3. Crash Reduction (by severity)	4. Delay Reduction	5. Travel Time: Truck Route/ IM Conn./STRAHNET 6. Activity Center 7. Land Use Plan 8. Access Mgmt.	9. Gross State Product 10. Economic Development Policy Area		B/C	Deliverability, Funding Sources, Readiness, etc.
Enhancement								

Source: Cambridge Systematics, Inc., 2008.

Challenges in Implementation

The biggest challenge for Georgia DOT was getting consensus with the planning partners. There was initial disagreement on the project prioritization approach and methodology that had to be overcome. Georgia DOT did develop an automated tool to easily generate scores and performance measures for the 900 project. The overall performance was bucketed into four tiers (1 through 4) and used as guidelines. For the project, there was a small staff – around four people from start to finish, and this was relatively easy because the tool was a spreadsheet Excel model. The more challenging piece was understanding methodology and how scores were assigned. Because data was already in the system, the data collection stage was easy, although QA/QC was a lot of work.

One lesson learned was that in budgeting for this type of analysis, an agency should never compromise on stakeholder engagement because this is what has a pivotal road on the outcome of the project. Georgia DOT made sure everyone was on board from start to finish from the MPOs, the Regional Commissions, as well as the two transit authorities. Economic development stakeholders were invited, but not planning partners.

Finally, a main suggestion is that whoever houses this study of performance-based planning with economic impacts elements should have a project manager completely dedicated to this exercise. The level of effort is 9 out of 10.

Economic Analyses Reports

Georgia DOT has pioneered the Project Prioritization Process, which is a key business process that the Department uses to accomplish its mission. It is a systematic and rational approach to choosing STIP projects that enables leadership to prioritize projects by their benefits/costs and risks. Projects are prioritized and compared with the funding available. Economic growth variables are included as 2 of the 10 performance measures. A PowerPoint of this process, presented at a September 2008 TRB conference, can be found here: http://onlinepubs.trb.org/onlinepubs/archive/conferences/2008/statewide/pdf/beagan-ppr.pdf.

The STIP is developed under the framework of the 2010 to 2030 SSTP which can be found here: http://www.dot.state.ga.us/informationcenter/programs/transportation/Pages/stip.aspx.

3.8 MONTANA DOT

Approach for Economic Analysis at the Agency

In 2001, in response to interest in the potential economic benefits of highway expansion, the Montana DOT initiated a study to examine the economic impact of reconfiguring Montana's major two-lane highways. The project launched the development of a software tool that would evaluate the economic benefits and costs of proposed highway projects, and develop and analyze several scenarios for highway reconfiguration options, called HEAT. This led to the hiring of a dedicated economist on staff; some spin-off internal benefit-cost tools; and an internal tool called the preliminary estimating tool (PET), which uses average bid prices for selected roadway items and adjustment formulas based on project type related assumptions.

In the last several years, Montana DOT has been focused on generating many "quick-hit" studies for project level:

- Benefit-cost analyses (for loans and grant applications – TIGER, Rail-loan funds and sometimes competing projects). This would entail the use of REMI and a six- to eight-page summary write-up.

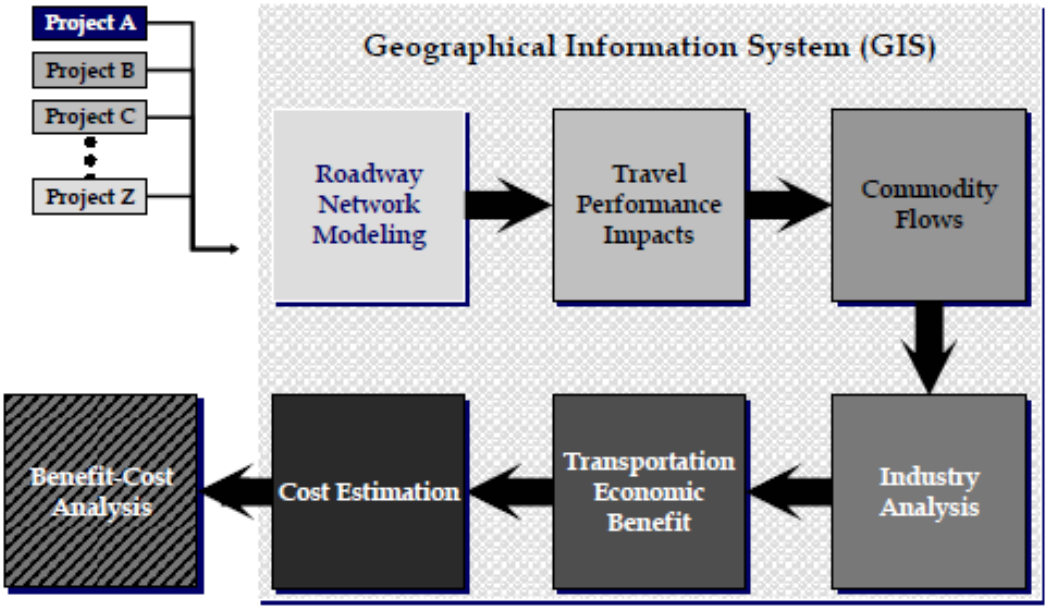
- Economic impact analysis for proposed coal mines and local transit systems (urban bus systems) at an industry scale. These are three-page briefs to give program manager an analysis to hand to a policy-maker. This would require the use of REMI; and outputs would include projected GDP, income, population.
- Socioeconomic analysis. In the past, Montana DOT would hire them out as one chapter of an environmental analysis. Each of these analyses that is generated in-house can save $4,000, and maintain a level of consistency. Some of the tools used include Census data and REMI economic software.

Montana DOT does not do the project prioritization at the programmatic level, although they are considering this will the upcoming redevelopment of HEAT.

Specific Tools and Data Used at the Agency

The toolbox developed to accomplish the evaluation of the reconfiguration study objectives became known as HEAT, which provides a much more detailed understanding of the relationship between specific changes in highway capacity and economic development, provides data and models to quantify that relationship, and estimates the likely economic impacts of a range of highway improvements within both a constrained and unconstrained fiscal environment. Figure 3.5 shows the analytical modules within HEAT.

Figure 3.5 Montana HEAT Analytical Modules



Source: MDT Highway Reconfiguration Study, 2005.

Absent a four-step statewide travel demand model, HEAT employs a network assignment module that approximates how travel will react to a proposed improvement. This simple assignment routine is not sophisticated and would

underestimate the full range of travel behavior changes that may result when so many roadways are reconfiguration. HEAT would not take such synergies into account to the degree that they exist.

Right now, HEAT is running on a legacy computer. After the use of HEAT for the Reconfiguration Study, the HEAT tool proved difficult to work with, as data and modules were difficult to update. At this point, Montana DOT is in the process of redeveloping HEAT.

For the variety of ad-hoc studies conducted at Montana DOT, REMI is used. For Montana DOT, the REMI model is constructed on five districts and 70 sectors – and there is a built-in commodity flow data. Montana DOT maintains a license for this purpose. The initial cost for REMI was $50,000 with annual maintenance fee is $19,000, and the technical support is excellent. Montana DOT also purchases data from Global Insight at $1,200 per year.

Performance Measures

The Transportation Economic Benefit module, shown in Figure 3.5, involves estimating the job creation, growth in personal income, and changes in regional output generated from completing the project. The outputs include three measures that capture Business Productivity, and one that captures Business Attraction.

Business Productivity Measures

- The dollar value of the savings in production costs for each existing industry at various locations in Montana. This represents the potential cost savings benefits for existing businesses in Montana. The expense savings for households also are calculated in a similar manner.
- The relative cost competitiveness for each existing major industry in various locations in Montana. This is measured as the ratio of business operating cost in Montana relative to the national average – measured with and without highway improvements under alternative scenarios.
- The change in potential business markets for each existing major industry in various locations in Montana – measured as the additional sales revenue potentially achievable if businesses were able to compete and grow in proportion to the expansion in size of their markets for customers and supplier access.

Business Attraction Measure

- The Business Attraction Module in HEAT focuses on how enhancing strategic connections between specific locations can attract outside business activity and investment into the affected area. This impact is dependent on the location of highway investments, the linkages such investments create, and the effect of such investments on the market reach of businesses located

in affected areas. These estimates of direct impacts on business attraction are analyzed independently; and then input to the economic simulation model in order to calculate the total (direct, indirect, and induced) impacts on the economy analysis.

Challenges in Implementation

The main lesson learned is that an agency has to take the risk and spend the initial time and resources in order to build a value and a case for economic analysis. Doing several quick hit studies has been important to show the value of the investment in the REMI purchase at Montana DOT. Fossum also has begun to build both internal and external clients for economic analysis work; his external clients include transit agencies; a proposed coal mine; and sectors interested in the value of transportation such as energy, wind, agriculture. For instance, for the oil and gas sector, every well developed generates approximately 1,400 new trucks, which impacts road design.

This is Montana DOT's second year using REMI and Fossum has a goal to show the value for investing in this tool. There is a lot of traction to do analyses at the project level; however, there is more interest in figuring out programmatic opportunities.

Staff training was critical, but suffered through the recession; there were three years of deferred training, and the germination of ideas and peer networks has suffered over the recession.

Important agency and stakeholder partnerships include the Bureau of Business and Economic Research at the University of Montana, who has the same REMI model; the Montana Department of Commerce; Department of Labor and Industry; and Montana Legislative Fiscal Division.

Economic Analyses Reports

The Montana Highway Reconfiguration Study was developed to evaluate the impact of reconfiguring Montana's two-lane highway network to a four-lane network on Montana's economy. To do this, HEAT was developed to analyze the economic impact of such a project. The project summary and final report from 2005 can be found here: http://www.mdt.mt.gov/research/reconfigstdy/.

Montana DOT's PET uses average bid prices for selected roadway items and adjustment formulas based on project type-related assumptions. The PET tool can be downloaded here: http://www.mdt.mt.gov/business/contracting/cost.shtml.

Several studies have been produced internally, including the Economic Impacts of Missoula Mountain Line Transit System (2012) and Economic impact of the proposed Otter Creek coal development (2011). Copies of these can be provided by request from Hal Fossum at Montana DOT.

3.9 KANSAS DOT

Approach for Economic Analysis at the Agency

Over the last 10 years, Kansas DOT has become increasingly more sophisticated in its ability to communicate about economic impacts. Over this period of time, the agency has done three studies in this arena.

- Kansas DOT started looking at projects that had already been built to measure the economic impact pre- and post-development. Kansas DOT assembled a report on five case studies using an approach laid out by the FHWA. They took a transportation project in one county and compared it to a peer county to look at whether the major transportation investment was a contributor to economic growth.
- Kansas DOT did a study on maintaining current investment in existing infrastructure from the standpoint of transportation's economic importance. This study assumed maintenance funding would decline dramatically and looked at different scenarios for the State.
- In the last few years, Kansas DOT has been setting up a new program for thinking about a series of expansion type projects. These would be tied to economic growth in certain parts of the State and help legislators build a story about economic impacts in transportation investments for the LRTP. Kansas DOT created a working group to move beyond talking about travel time savings and other "esoteric" measures, but more on how to communicate how a project creates jobs or growth.

Specific Tools and Data Used at the Agency

Kansas DOT decided on using the TREDIS model, and assembled the data and ran the model with internal staff employees. The effort included the analysis of nearly 200 projects over a 20-year future timeframe. Because Kansas DOT is more centralized in comparison to other DOTs, much of the data was already at headquarters (including traffic counts current and forecasted) and project cost information. Local engineers were consulted on different trends and new development not captured by the data.

The advantage in using TREDIS was because it is web-based, and each analysis could be "publicly" vetted to share inputs and assumptions with district engineers or project managers. Kansas DOT was one of TREDIS' first customers, and they were very responsive and gave great support on the phone.

Kansas DOT does not have a statewide transportation model and, thus, did not use it for calculating user benefits.

Performance Measures

Three metrics were used to "score" projects: engineering data, a local consult score which is based on regional support, perceived safety and system connectivity benefits, and an economic impact score. These criteria are shown in Figure 3.6. For expansion projects and modernization projects, Kansas DOT calculated a economic impact score based on its performance in terms of creating or retaining jobs (excluding construction jobs); expanding GRP; and increasing the value of traveler benefits in terms of their time costs, vehicle costs, and safety costs.

Figure 3.6 Scoring Criteria by Project Type for Kansas DOT T-Works Projects

	Engineering Data	Local Consult	Economic Impact
Preservation	100%		
Modernization	80%	20%	
Expansion	50%	25%	25%

Source: Kansas DOT Briefing Paper: Expanded Highway Project Selection Process, 2010.

All Kansas DOT's economic impact scores are derived from a macroeconomic "input-output" model of the Kansas economy. Two main metrics were then scored based on the outputs generated from TREDIS:

1. **Anticipated change in study area jobs by 2030.** This may include jobs created by contingent development due to the project; jobs created or retained as a result of improved economic productivity due to shorter and more predictable travel times; and jobs created or retained as a result of expansion in markets due to improved travel speeds or improved access.
2. **Anticipated change in net present value of study area GRP/safety benefits by 2030.** This may include GRP added due to contingent development due to the project; GRP added due to improved economic productivity caused by shorter and more predictable travel times; GRP added due to expansion in markets caused by improved travel speeds or improved access; and safety benefits caused by a reduction in injuries and fatalities on safer roads.

Challenges in Implementation

One challenge in the analysis was the use of the "Business Attraction" within the economic performance measure, which was a presumed notion of growth

impacts with adjacent uses. The assumptions could be widely ranging depending on the model used; and to agree on these assumptions, it often took multiple meetings with different people to agree on a final number.

The issue of agency and partnership collaboration was critical. The very beginning of this partnership started with the development of the LRTP. That then spurred the Governor to create a Transportation Task Force (T-Link) to go to the legislature. The T-Link Blue Ribbon Panel (local officials, construction industry, etc.) was instated to add economic analysis in project selection. In that process, Kansas DOT worked closely with chambers of commerce, cities, and counties (staff and elected officials), five MPOs (staff and board), transit, aviation, rail, contractors, and motor carriers, and three to four times. The e-mail list for this process included more than 2,000 names.

Kansas DOT conducted much of the analysis internally. The overall learning curve seemed short, as staff did not need that much training. Although it took several staff people over multiple months, it did not cost much in terms of an outside consultant or extra resources outside the agency. However, there was a lot of internal support at the executive/director level to make the case that this was an important issue.

Kansas DOT felt it was important to have a credible process, but a simple straightforward one. The goal was not to create a black box that nobody understood. Ultimately, it was important to recognize that economic impact is an important factor in project selection, but should not be the only factor. If you only used economic impact as the only performance measure, it would have undesirable result for transportation provision.

Economic Analyses Reports

The Kansas DOT Briefing Paper on the Expanded Highway Project Selection Process (2010) was written by Kansas DOT staff describing the process used to develop an improved process for project prioritization and selection. This paper describes how Kansas DOT has worked with the T-Link Task Force to create a three-prong approach for scoring possible highway projects, and then pilot tested that approach. The report can be found here: http://www.kansastlink.com/downloads/Project%20Selection%20Process%20White%20Paper.pdf.

In August 2008, then Kansas Governor Kathleen Sebelius created the Transportation-Leveraging Investments in Kansas (T-Link) Task Force to examine the state of transportation in Kansas, and to develop a set of recommendations that "frame a new strategic approach to our future transportation needs." The T-Link Task Force developed the project selection process. This report can be found here: http://www.kansastlink.com/report.

3.10 WEST VIRGINIA DOT

Approach for Economic Analysis at the Agency

Economic analysis is a relatively new pursuit by West Virginia DOT. The director of the Program Planning and Administration Division saw economic analysis as an additional tool to analyze transportation projects. He thought economic analysis might be seen more as an objective analysis method, as opposed to some of the others that may be seen as very subjective and, possibly, political. The director also wanted to do a better job of "selling" transportation projects and the taxes and/or fees they may require by showing the economic benefits and the relative costs to property owners, taxpayers, out-of-state travelers, and others.

At the moment, there has been benefit-cost analysis conducted for the Multimodal Statewide Transportation Plan (STP). In addition, the division often conducts ad-hoc research projects of a quantitative nature.

West Virginia DOT has recently hired the first economist for the agency.

Specific Tools and Data Used at the Agency

West Virginia DOT's STP utilizes a benefit-cost spreadsheet model (B/C Tool) to prioritize and rank projects. Staff also had been exploring the purchase of REMI, although the agency does not currently have a license.

Performance Measures

The prioritization procedure uses benefit-cost ratios based on transportation user costs, as well as other factors to compare highway projects. User costs include travel times, vehicle operating costs, and safety benefits associated with highway improvements. The procedure also allows estimates of other benefits to be incorporated into the prioritization process. In additional to conventional user benefits for time, vehicle operating cost, and safety savings, the procedure accounts for economic development benefits associated with job creation. It also accounts for the willingness of other public agencies and private groups to provide funding for specific projects.

Challenges in Implementation

In the past, different engineers would use the B/C Tool differently for his/her own project. This introduced the possibility of errors due to lack of understanding of the model or different interpretations of the required data. The new econometrician at the West Virginia DOT was hired to perform all benefit-cost analyses for the agency to provide continuity in the analysis.

In the past, some staff members may have lacked the expertise to perform the analysis, resulting in variation between results in different project analyses. The new economist ahs training in quantitative analysis, and is better qualified to

perform nonengineering research. This new economist will also perform other studies that had not been performed in the past, such as revenue and expenditure analysis and forecasting.

Going forward, there certainly is a desire to incorporate economic analysis into West Virginia DOT's planning, but early implementation of that effort has been slow.

Economic Analyses Reports

Long-term goals and policies for West Virginia DOT currently reside in West Virginia's Multimodal STP for 2010 to 2034, which discusses in broad terms the long-range goals and objectives of its member agencies. This new plan not only meets new Federal requirements, but also makes the plan more project specific by incorporating a tool for calculating a preliminary benefit-cost ratio on larger projects. This tool, in conjunction with other data, can be used to help prioritize larger projects, which must compete for scarce resources. The new prioritization tool allows both existing unfunded projects and future proposals to be monitored and adjusted to meet the needs of the citizens of West Virginia. This document can be found here: http://www.transportation.wv.gov/highways/programplanning/planning/statewide/Documents/West_Virginia_Long_Range_Multimodal_Transportation_Plan.pdf.

In addition to the State's LRTP, in January 2008, the agency produced a Six-Year Statewide Transportation Improvement Program (STIP), which was a result of the merger of the Six-Year Program with the Federally required STIP. The Six-Year STIP includes a wide variety projects, including roadway, bridge, bicycle, pedestrian, safety, and public transportation (transit) projects. It is found here: http://www.transportation.wv.gov/highways/programplanning/STIP/stipfiles/Pages/default.aspx.

3.11 NORTH CAROLINA DOT

Approach for Economic Analysis at the Agency

Economic analysis is conducted at many levels at the North Carolina DOT. In past years, economic analyses have been done for the various modes: ferries, general aviation, and light rail, as well as the tolling efforts on I-95. However, the logistics task force convened three years ago cemented the conversation about North Carolina's role in the regional economy. This series of studies brought in the private sector (e.g., private trucking, rail, commerce secretary); and looked at logistics villages and maritime studies on small ports.

The big effort in recent years, however, is the input of economic measures in the Program and Resource Plan 10-year plan and the projects selected for the STIP. For the first round of strategic prioritization (Prioritization 1.0), Governor Beverly Purdue, in January 2009, issued an Executive Order No. 2,

Transportation Reform at North Carolina DOT. The Order required projects to be awarded based on professional standards, which meet the needs of the citizens of the State and not simply on political considerations. To support this Order, the Strategic Planning Office of Transportation (SPOT) office was charged with developing a data-driven process to be conducted in a transparent and easy to understand manner. The initial prioritization effort is now complete with the release of the Draft STIP in June 2010.

This second round of Prioritization 2.0 (P2.0) now includes economic impact and a benefit-cost component for highway projects as performance metrics. In November 2011, North Carolina DOT released the results of the P2.0 process.

Specific Tools and Data Used at the Agency

Although North Carolina DOT has a statewide model, it is not used for project prioritization. For generating the economic competiveness output, TREDIS is the software used in North Carolina DOT's Project Prioritization 2.0 process. A portion of project scoring is based on economic competitiveness, as determined by North Carolina DOT staff using TREDIS. The primary input is the change in VHT calculated from travel time savings. The output is value added based on percent change in the baseline, with measurements of jobs created, wages increased, and increased productivity. The TREDIS model includes forecasted baseline growth data from Moody's.

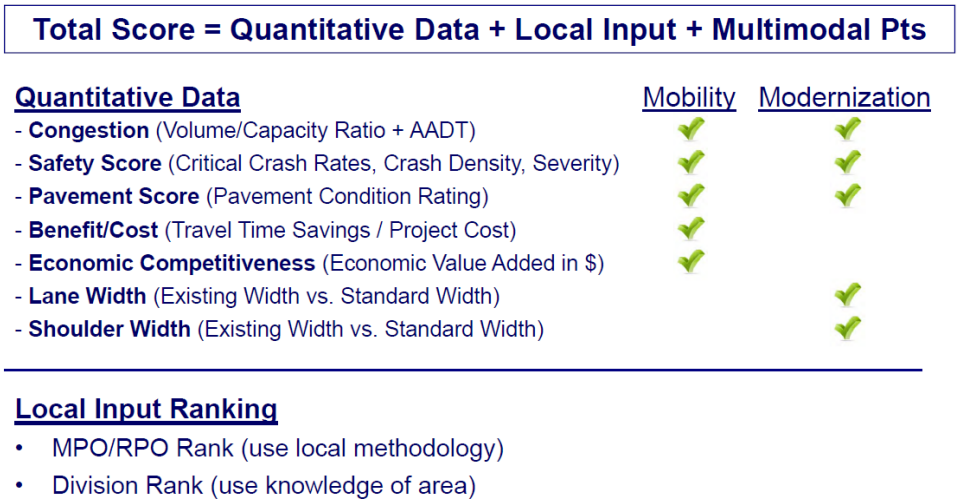
Performance Measures

Approximately 1,200 highway projects, more than 600 bicycle and pedestrian projects, and almost 100 transit projects were scored in P2.0 based on how well each project met an existing transportation need (such as reducing congestion) and on how it aligned with local community priorities. The scoring matrix is shown in Figure 3.7 with economic competitiveness as one of the key performance measures. The output of P2.0 serves as input into the Department's next draft 10-Year Work Program (expected to be released in late spring 2012).

Challenges in Implementation

It may be too early to tell the lessons learned from North Carolina DOT's application of economic analysis in their prioritization process; however, it is clear that there is polarized support and opposition to benefit-cost, local contribution and economic impact analysis factors. There was concern about penalizing rural areas based on the current findings. The economic competitiveness "weight" differs by the tier of project. For instance, for statewide projects, economic competiveness is weighted 10 percent, while for regional and subregional projects, the economic factor is only weighted 5 percent.

Figure 3.7 Scoring Criteria for North Carolina DOT Prioritization 2.0 Process



Source: North Carolina DOT Prioritization 2.0 Process, 2011.

Economic Analyses Reports

The North Carolina DOT Executive Order No. 2 called for reform in decision-making at North Carolina DOT, and Executive Order No. 3 called for improvements in performance management and accountability in state government. This document "North Carolina DOT from Policy to Projects" is the Transportation Reform framework developed to meet those mandates to improve transportation decision-making. The document can be found here: http://www.ncdot.gov/download/performance/Policy_to_Projects.pdf.

Prioritization of projects will help drive the development of the next 10-year Work Program. The Department's Prioritization process is solely focused on ranking projects. More information regarding this process can be found on the NCDOT Transportation Reform page: http://www.ncdot.gov/performance/reform/.

More information on the strategic prioritization page can be found here: http://www.ncdot.gov/performance/reform/prioritization/.

3.12 WISCONSIN DOT

Approach for Economic Analysis at the Agency

Beginning in 1981, the Wisconsin Legislature renewed a transportation bonding program that led to a Transportation Projects Commission (TPC) to evaluate the merits of candidate major projects; and to recommend projects to the Governor and Legislature for statutory enumeration (i.e., authorization for construction). Wisconsin DOT is in charge of analyzing the potential economic development benefits for these major projects. The selection of major highway investment

projects in Wisconsin is explicitly based upon the potential each project has to contribute to economic development, both regionally and statewide. Highway infrastructure investments most strongly support economic growth through their impact on industrial productivity; good investments make regional industries more efficient by lowering their overall transportation costs.

Wisconsin also has a program, started in 1987, called the Transportation Economic Assistance (TEA), which provides state grants to public and private businesses to help attract employers to Wisconsin, and to help businesses remain and expand in the State, creating jobs and economic development. Economic analyses are conducted around 10 to 12 per year at the agency.

Because of these two programs, Wisconsin had an early start to the development of economic impact analyses. For over 25 years, Wisconsin has conducted many analyses at the policy level, the program level, the project level, and a variety of modal economic studies as well.

Specific Tools and Data Used at the Agency

Early on, Wisconsin DOT started with the use of REMI for economic analysis, but also has since purchased IMPLAN and TREDIS to use for various analyses. Although the Department is considering whether it makes sense to continue the license for all three economic engines, at the moment, they are able to justify the purchase and maintenance of these software. The cost for REMI was a $50,000 initial investment with annual license of $12,000 per year. The cost of IMPLAN is $1,300 per year; and TREDIS is around $25,000 to 35,000 per year. Data for freight also are maintained through subscriptions to TRANSEARCH and Freight Finder.

Much of the data inputs for the economic models are obtained through Wisconsin DOT's asset management system, Meta-Manager. There are two predominant asset management systems at Wisconsin DOT: Meta-Manager and the Wisconsin Information System for Local Roads (WISLR). Meta-Manager is used for budget allocation and performance evaluation for the state roadway system. WISLR is used for inventory, certification, and budget allocation for local roads and county trunk lines.

Wisconsin DOT does have a statewide model that is derived from the WISLR and the State Trunk Highway (STN) System.

Performance Measures

For evaluating and ranking highway major projects from an economic development perspective, performance measures include the following.

- Regional data: Value added and employment by industry;
- Transportation dependency for supply chain by industry;
- Interindustry trade and buy-sell relationships;

- Productivity and connectivity; and
- Economic growth and exports.

Projects are prioritized by their potential to increase the productivity of the specific industries along the corridors served by the projects. A highway project with great potential for contributing to the productivity of the industries along the corridor will score higher than a project with less potential to boost the productivity of industries along its route. Through this type of analysis, the highway network in Wisconsin is designed to increase the efficiency and competitiveness of businesses in the State, allowing firms to increase output and hire new workers.

Challenges in Implementation

Wisconsin DOT is fortunate to have many resources for economic impact analysis. Because the efforts started in the late 1980s, there have been many years of capacity building, staff training, and a continuous move to improve the technical capacity within the agency. Over the years, strong collaborations have been with the Wisconsin Department of Commerce, the Department of Natural Resources, and the Department of Agriculture, as well as the various trade associations.

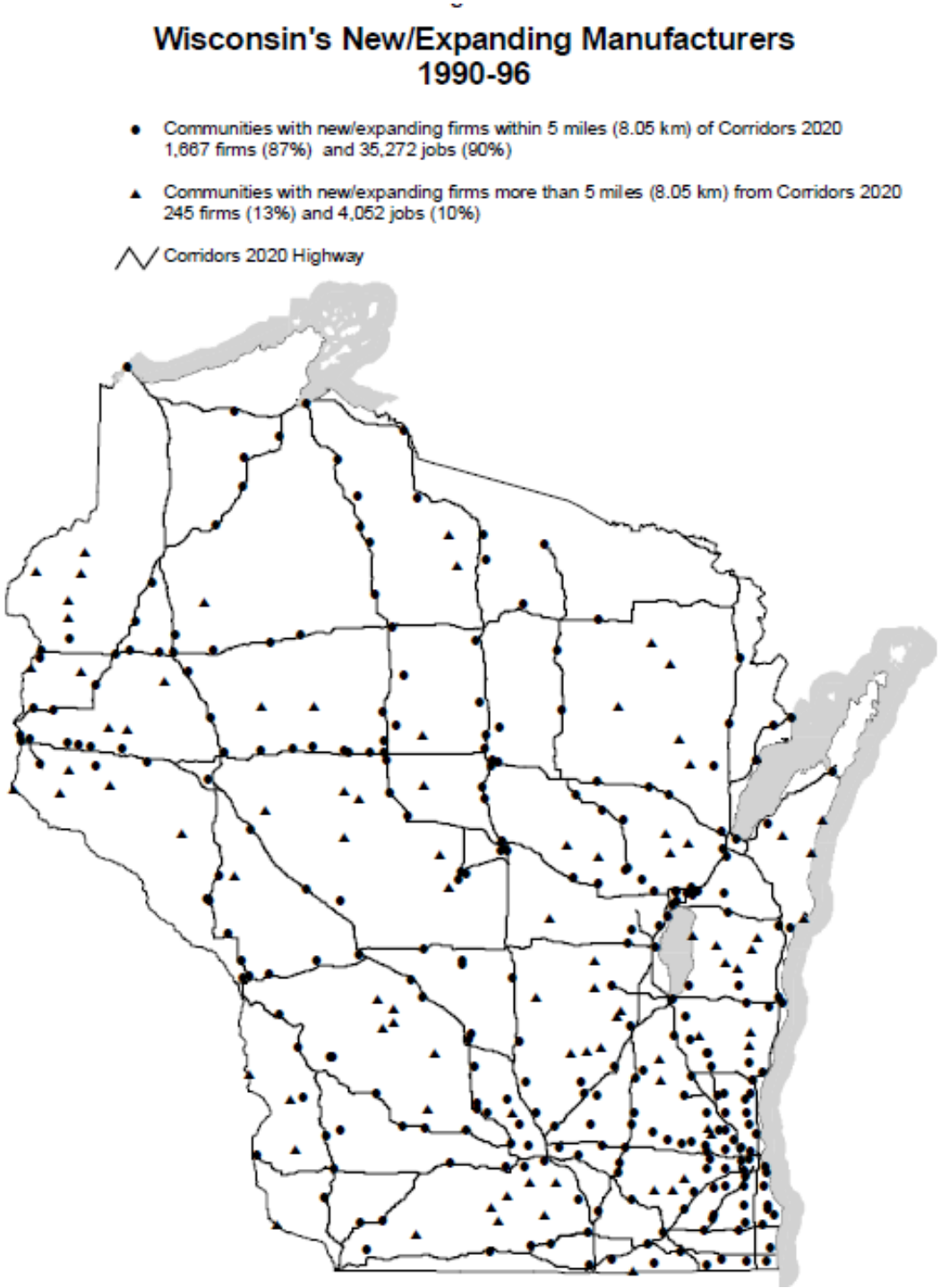
Data availability also was a challenge, but over time, the tools and data have been purchased and applied to provide better information on all the modes, including freight.

The staff of economists include one dedicated technical lead, two full-time freight analysts, and several part-time staff dedicated to GIS and modeling. Each staff person also tracks the trends for different modes, as they all have different global and national trends for growth.

The key lesson learned is that it is very important to make the case for why transportation is important to the economy. Once state legislators and the governor are provided evidence for business locating close to transportation corridors, it is an easy sell to support transportation investments.

Figure 3.8 is an example of "making the case" for transportation investments. It shows a Wisconsin study that found that 87 percent of all new and expanded manufacturing businesses were in communities located within five miles of a planning Wisconsin 2020 corridor route, accounting for 90 percent of the new jobs generated during the 1990 to 1996 period.

Figure 3.8 Manufacturing Jobs Attracted to Wisconsin 2020 Corridors



Source: Liat Lichtman, A Study of New and Expanding Manufacturing Plants in Wisconsin during 1990 to 1996: Analysis of New and Expanding Manufacturing Plants along Wisconsin's Highway Transportation Corridors.

Economic Analyses Reports

The selection of major highway investment projects in Wisconsin is explicitly based upon the potential each project has to contribute to economic development, both regionally and statewide. Highway infrastructure investments most strongly support economic growth through their impact on industrial productivity; good investments make regional industries more efficient by lowering their overall transportation costs. Details are here: http://www.dot.state.wi.us/business/econdev/highway-major.htm.

The TEA program provides 50 percent state grants to governing bodies; private businesses; and consortiums for road, rail, harbor, and airport projects that help attract employers to Wisconsin, or encourage business and industry to remain and expand in the State. Projects undergo economic impact analysis for eligibility. Details are here: http://www.dot.wisconsin.gov/localgov/aid/tea.htm.

Wisconsin's Transportation Development Association produced a study of the benefits of transportation investment in Wisconsin. The study included both quantitative and qualitative research on how transportation investment affects business efficiency, job creation, economic business growth, tax revenues, safety, and quality of life. This helps to make the case for transportation in Wisconsin. The document can be found here: http://www.tdawisconsin.org/data/publications/cambridgecomplete.pdf.

A comprehensive list of reports produced by Wisconsin DOT can be provided by Dennis Leong upon request.

4.0 Current Efforts in Idaho and Lessons Learned from Other DOTs

This section briefly lists the current efforts in ITD, and then summarizes the findings of the interview to provide a set of lessons learned for Idaho as the State embarks on its goal to measure economic impact from the agency's operations.

4.1 CURRENT EFFORTS IN ITD

According to the Draft Strategies and Actions from ITD's Economic Opportunities Plan (January 20, 2012), one of ITD's draft goals is to *provide a mobility-focused transportation system that drives economic opportunity*.

As Idaho has developed, investments in its roads, railroads, canals, and rivers have always preceded economic growth. Taxpayer dollars are spent on transportation projects after rigorous analysis of safety, congestion, optimum life cycle, and many other factors. The investment return to Idaho citizens is improved quality of life and prosperity.

Improving and maintaining Idaho's infrastructure is a key component of Governor C.L. "Butch" Otter's vision to strengthen and diversify the State's economy through his Project 60 Initiative. Project 60 is Governor Otter's plan to grow Idaho's gross domestic product from $51.5 billion to $60 billion by selling more of Idaho's products and services to the world and showcasing Idaho's stable and predictable tax and regulatory environment.

Idaho's GSP and the State's transportation system are intrinsically linked. People and businesses depend on a network that provides safe, reliable, fast, and efficient service.

ITD plans to measure the following elements within the agency's planning processes:

1. Increase in the efficiency in which goods are transported;
2. Increase in Idaho's GSP;
3. Increase in jobs and business revenues; and
4. Reduction in travel times for community, commerce, recreation, and tourism.

4.2 LESSONS LEARNED FROM OTHER STATE DOTS

Based on the interviews and further research with 12 state DOTs, a summary of results is shown on Table 4.1. This table shows the types of economic analyses conducted (i.e., where it is housed in the transportation hierarchy outlined in Section 2.1); whether a statewide transportation model is used to generate inputs for an economic analysis model; what type of economic engine the agency typically uses; the cost in terms of staff time, consultant time, and license fees; and any key partners that are leveraged by the DOT.

Overall, summary findings from the 12 interviewed DOTs are as follows:

- The most common form of economic analysis conducted was at the strategic planning/program level. Many states such as Michigan, Florida, Missouri, and Kansas have launched regular program-level economic analyses on a regular basis in conjunction with a five-year workplan.
- Some states such as Kansas, Minnesota, and North Carolina have successfully used TREDIS as the underlying economic engine to prioritize projects based on macroeconomic impacts. Each DOT expressed satisfaction in the level of support provided. A key benefit was the on-line format of the tool to allow regions to also view and review analyses to avoid the "black box" effect.
- Due to the last round of stimulus funding, several states have utilized benefit-cost analysis for their TIGER applications. One state DOT expressed value in the fact that TREDIS had a module for this very purpose.
- About one-half of the interviewed DOTs used their statewide transportation model to provide inputs to the economic model. However, for many, this statewide model also was coupled with data from regional MPO models, which may have inconsistent data.
- Many states used REMI or TREDIS as their main economic engine to provide economic output results, although internal B-C tools and off-model spreadsheets also were very popular. Montana and Georgia both used HEAT, which was able to provide a comprehensive economic analysis package for strategic planning and project prioritization.
- There was a wide range in the resources spent by DOTs to conduct economic analysis. Some states such as Michigan and Wisconsin do a significant amount of analysis in-house; whereas, Florida, Texas, and Montana request significant consultant support. DOTs such as Michigan and Minnesota have benefitted from universities that have had licenses to the same REMI model, and can either validate results or provide peer support for analysis. Wisconsin DOT is unique in that it helps other state agencies perform economic analysis because they are the statewide experts in economic impact analysis.
- The strongest collaborative partners include local universities, state chambers of commerce, and state economic development corporations.

Table 4.1 Summaries of Economic Analyses Conducted at Interviewed DOTs

State	Types of Economic Analyses Conducted					Statewide Model Used	Economic Engine	Cost (Staff/Tool)	Key Partner
	To Determine Amount of Investment	Strategic Planning/ Program Level	Project Prioritization	Corridor/ Alternatives Analyses	Other (Ad-Hoc, TIGER, etc.)				
Michigan	●	●				Yes	REMI	2-4 staff; $55K annual license	University of Michigan
Florida	●	●		●	●	No	REMI	1 staff; consultant fees	Florida Economic Development (Seaport, Chamber of Commerce, etc.)
Missouri		●		●	●	No	REMI, TREDIS for I-70 Study	Consultant fees	Missouri Department of Economic Development
Indiana	●	●	●		●	Yes	MCIBAS, REMI	Consultant fees; $11K annual license	Indiana Economic Development Corporation
Texas		●		●	●	Yes	TREDIS, PEET	1 staff; consultant fees; license fees	Texas Transportation Institute, state universities
Minnesota	●	●	●		●	No	Minnesota DOT's own benefit-cost tool, TREDIS for TIGER, REMI at state level	1-2 staff; consultant fees	University of Minnesota, Minnesota Department of Employment and Economic Development
Georgia		●	●			Yes	Georgia HEAT	Up to 4 staff; consultant fees	Atlanta Regional Commission
Montana				●	●	No	Montana HEAT, REMI	1 staff; $19K annual license	University of Montana Bureau of Business and Economic Research
Kansas	●		●			No	TREDIS	3-4 staff; license	Large stakeholder group (included Chamber of Commerce, MPOs, cities, and counties, etc.)
West Virginia			●		●	No	B/C Tool	1 staff	TBD
North Carolina	●	●	●		●	No	TREDIS	3+ staff, license	North Carolina Department of Commerce
Wisconsin	●	●	●	●	●	Yes	REMI, IMPLAN, TREDIS	3-4 staff; approx $50K in annual licenses	Wisconsin Department of Commerce

- Policy Perspective: Economic analysis helps identify overall investment levels needed to meet transportation needs and allows decision-makers to devote resources to their best uses (in terms of maximizing benefits to the public and their customers.)
- Strategic Planning/Program level: Economic analysis helps analyze performance data and tradeoffs when allocating departmental resources among programs.
- Project Prioritization: Economic analyses helps screen alternatives to identify the level of cost-effectiveness and return on investment and to assess risks associated with project delivery.
- Corridor/Alternatives Analysis: Economic development impacts as a factor in determining key economic corridors. Some economic analysis is used in selecting between alternatives in an environmental process.
- Other (Ad-Hoc, TIGER, etc): Economic analyses for development projects, in support of ARRA funds or TIGER grants, or modal studies.

A. Appendix A: An Interview Guide on Economic Analysis Practices in State DOTs

Cambridge Systematics, Inc.
April 2012

Cambridge Systematics is working with Idaho Department of Transportation (IDT) to assess ways to incorporate economic analysis into IDT's transportation planning activities. We are summarizing the activities of other state DOTs regarding how they use economic analysis tools and data. We are planning to summarize technical tools and data used at each agency, staff training activities, steps followed to implement economic analysis, and ways in which economic analysis results are used by agency decision-makers.

Goals and Objectives

1. We are interested in the reasons why your agency decided to take an economic approach to assessing transportation, both at the project selection level and the programming level. What were your overall goals and objectives regarding the pursuit of economic analysis at your agency? What were the type of projects and decision-making needs you had for using economic analysis in transportation planning?
    a. Did you have a specific reason to do a project-level economic analysis?
    b. Did you have a specific reason to do a programmatic-level economic analysis?
2. Please provide a summary of the types of economic analysis you conducted at your agency – and when. If you have any final reports, would you be willing to share them?

Tools and Data

3. I would like to ask some questions regarding the tools and data used for economic analysis at your agency.
    a. A transportation model would provide measurement of direct user benefits from specific improvements to the transportation network. Were you able to use your in-house transportation model and how?

b. A county-to-county commodity flow database and forecast is useful to provide commodity flows for current and future years. If you used this data, which source did you use and what were the pros and cons?

c. An economic engine takes the information and translates transportation data into economic impact. What did you use for economic analysis? [i.e., TREDIS, REMI, IMPLAN, RIMS II, Economic models] Does your agency continue to maintain this data and license?

d. Cost estimation is an important input into the economic model. How do you collect and maintain this data, and are there consistency issues?

e. Industry profile libraries provide recent global, national and state trends for each industry or industry cluster. If you assembled industry profile characteristics, were you able to map the importance of transportation to each industry's competitiveness?

Implementation

4. What were the biggest successes and challenges to implementation of economic analysis into your project selection or program planning? You may want to address the following:

   a. Staff Training;

   b. Timeframe/Schedule;

   c. Agency and Stakeholder Partnerships/Collaboration; and

   d. Successful and unsuccessful outcomes

Results

5. Based on the application of the economic analysis, might you have lessons learned regarding the following areas?

   a. Stakeholder engagement;

   b. Interagency partnerships/key collaboration;

   c. Data availability;

   d. Cost of tool or staff resources;

   e. Analytical comprehensiveness and scope of the study; and

   f. Level of effort expected, required and ultimately expended.