

## Communicating the Value of Research: Contractor's Final Report

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Communicating the Value of Research  
*Contractor's Final Report*

November 4, 2008

NuStats LLC  
Austin, Texas

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## SUMMARY

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This report attempts to examine, identify, and understand effective communication practices of transportation researchers, to determine how the audience values the communication, and how these communication efforts relate to a project's implementation or success. Effective communication of the value of research is not only necessary to justify the resources spent on it, but is necessary to secure any funds and generate support for future projects. In short, this study serves as a communications project.

Communication is needed at every stage of the research process, in the appeal of the problem, in the research planning, in obtaining and justifying time and money needed, in convincing others to support a research effort, in advocating for its use or implementation, and in promoting the overall need for transportation research. Researchers need to use a variety of methods to accomplish these tasks, but do not necessarily embrace or understand the required components of successful communication. Nonetheless, knowing how to properly communicate the need for research is an essential part of the research process.

The focus of this study was to identify the audiences of transportation research, to define the product, and to recommend the best methods by which to communicate or connect the need for transportation research to its beneficiaries. Getting people to appreciate the value of research, in order to fund research, requires their understanding of the value of the research product. This understanding comes from the information that the researchers provide, therefore, it is important to consider how researchers communicate the value of their work from the early stages of a project and how to communicate throughout the life of the project. What is missing, however, is a well-honed strategy to guide researchers in communicating the benefits of transportation research at all stages of the research process.

Research consisted of examining communication variables and identifying the product and consumer by conducting interviews and focus groups with key stakeholders and decision makers, literature searches of relevant publications and Internet searches of transportation-related organizations and their Websites, case studies of producers and consumers of transportation research, and analyzing the synthesizing the data to develop a strategy to serve as a communication plan. The materials, best practices, and communication strategies were compiled into a Guidebook that will serve as a tool to assist state and local DOTs, other transportation authorities, and transportation researchers in effectively communicating the value of their research.

Successful implementation of this research and the communication plans described throughout this report will be determined if the benefits of improved communication gain local, state, and federal recognition, if training programs and seminars are conducted for potential users of the Guidebook, and if researchers see an increase in funding support.

## INTRODUCTION

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The goal of this study was to examine ways to effectively communicate the value of transportation research by identifying those who ultimately decide upon funding for research, those who advocate for such funding, and those who benefit from transportation research. Only when these key players are identified can researchers begin to understand how to develop ways in which to effectively communicate the need for research.

To determine this value of research is to determine the effectiveness, in terms of cost and outcome, of a research effort and to establish the need for and justify the resources invested in research. Determining this value requires examining all costs (i.e., investments) and all benefits (i.e., returns), and examining whether or not the perceived outcome was equal to, or greater than, the funds spent on the research itself.

To communicate the value of research is to communicate the need for it and to generate awareness and knowledge of the research; to convey the importance of research; and to clearly state its benefits: how it will improve upon what has already been established and develop new processes that can improve quality of life. To gain support, researchers must show, by specific examples, exactly what the benefits of a research effort will be.

Many transportation researchers, however, have difficulties communicating the value of research. These difficulties arise from and correspond to low audience awareness. The public is not always conscious of the benefits they receive from transportation research that has already been implemented and, therefore, do not readily consider the benefits of new or future projects. Decision makers, or those who decide whether or not to provide funding for a project, do not necessarily understand just how valuable transportation research can be, and researchers simply are not always equipped with the skills to actively promote their cause.

### Purpose and Scope

To accurately communicate value is to take an idea, such as “transportation research,” which can be somewhat abstract and vague in nature, and make it concrete in the minds of the audience (i.e., decision makers, the public, and other stakeholders). For example, a research effort that studies current roadways can determine the need for new roads, lead to the building of such roads, and can ultimately ease traffic congestion. Connecting the need for research to an end product, in a way in which the audience will clearly and immediately see the benefits, will result in support of the research effort.

To better communicate the value of research, researchers must first define the end result, or product, and translate the initial results into tangible, new insights or understandings, materials, methods, and technology. Researchers will also need to define the audience, or those who will benefit from the research product, whether they be transportation departments that will put a plan into action or a product into play, or the general public who uses the newly implemented products. And finally, researchers must measure how the value of their research is perceived, whether it be quantitatively (cost) or qualitatively (e.g., economic, social, or environmental gain), realizing that perceptions can run the gamut.

Finding common ground, therefore, becomes increasingly more important as more groups of people become interested and involved in a research project because different audiences will have varying desired outcomes. For example, if the product of a research project is going to be new roads, the

general public might prefer to commute less and might provide support; Chambers of Commerce might be pleased with providing businesses the opportunity to expand, therefore reaching a wider consumer base; but elected officials might not want to risk providing funds that might be put to better use.

Continuing and developing research through investment requires the measurement of the return on an investment (ROI). Our ROI analysis was based on interviews with key stakeholders, beneficiaries of research, decision makers, and those who generate influence. We also identified several examples of transportation research, or case studies, and for each analyzed the communication flow and content, the communication practices, the participants' understanding of their roles as communicators, the patterns of response to the communication strategy, and the effectiveness of communication in securing research support. In doing so, we found that some organizations measure the success of their communication by the numbers and types of media calls received, the number of hits on a Website, an increase or decrease in the number and amounts of donations, and by receiving long-term funding through federal legislation.

## **Current Context**

While investments in the transportation system roughly equal \$1.3 trillion annually, research is only a small part of federal and state transportation budgets, despite the fact that the return on investment can substantially increase the quality of life. As such, transportation researchers must be innovative as they participate in the ever-important national transportation debate.

Promoting investment in transportation research requires examining policy advocacy and diffusing information with the intention to influence legislation and the passing of certain laws by targeting policymakers. We were interested in the advocacy communication efforts that influenced the funding of research programs in Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) and the level of funding that the programs received. We also focused on the advocacy communications efforts that influenced the contents and funding levels associated with Title V of the legislation—Transportation Research.

How are we going to obtain federal funds for future transportation systems? The current Highway Trust Fund surplus balance will eventually be depleted, and Congress will be forced to increase taxes or find alternatives. Making Congressional members care equally about transportation research as they do about their multitude of priorities requires a champion who will advocate for research funding at the right time (i.e., as early in the process as possible and while the issue still has momentum), in the right place (e.g., Congressional hearings, Conference Committees), to the right people (i.e., staffers), and with the most effective, consistent, and lucid communication style.

Advocates need to consider the timing of research, their audience, the inspiration for the research, the succinct presentation of their research, and reaching the widest possible base. Additionally, clearly correlating the investment in research to its results, i.e., the reasons that it was useful to the public, is key, and advocates should concentrate on performance measures that have proven the savings of time, lives, and money; these messages will leave an impression with legislators, agencies, and the public and will help to continue the discussion.

## **Research Approach**

The goal of this research project was to determine the most effective ways of communicating the value of research by (1) ensuring that research beneficiaries recognize the benefits that they do receive and how they improve their lives and (2) ensuring that researchers understand the best ways

to communicate that value to those who will be affected by their research. To do this, we designed a survey that examined different variables:

We first had to identify the audiences of transportation research communication, the objective of Task 1. To do this we conducted outreach within the transportation research community by means of interviews with key stakeholders, such as elected officials, decision makers, policy makers, State DOTs, and other pertinent agencies. To reach the widest audience possible for this task, we used snowball sampling, which relies on referrals from initial subjects to generate additional subjects. From these people, we were able to determine the various audiences, how to position the transportation research product, and how to communicate messages to these audiences. Our research team also conducted interviews during professional meetings and conferences such as the TRB Annual Conference.

Our approach to the research included conducting case studies of a wide range of successful transportation research project investment decisions to examine the communication practices leading to funding and implementation. The goal was to determine what the current communication practices were, which were successful and which were not, and most importantly why some practices succeeded and others failed. We had to systematically question—what makes a communication practice successful? And do the attributes assigned to audiences and communication modalities noted within the first two tasks play a significant role in that success?

Case study selection, the objective of Task 3, was based on four criteria: a mixture of both “hard science” and “soft science” research; a variety of organizations performing the research and, ultimately, those with the communication plan (e.g., universities, state DOTs, private sector); a diversity in locations in which the research was being performed; and various types of audiences, or recipients of the communication. Task 4 of the project required examining each case, through interviews, and mapping the communication flow from initiation through implementation of the project, determining the communication practices used, eliciting the participants’ understanding of their roles as communicators, and determining typical responses to the communication strategies on which they relied. This research was designed from the information gathered in Tasks 1–3.

The next step in the work plan was to analyze the communication approaches and messaging strategies that were identified in Tasks 1–4 and develop a communication plan that describes the ideas and the tools needed for communicating the value of transportation research. Deeper analysis on communication approaches and messaging strategies focused on four main aspects: the analysis of the socio-political context, or the setting of the research project, focusing on any challenges and how they may have impacted communication; the analysis of the sender, or the organization responsible for designing and implementing a research project and, therefore, the communication plan; the analysis of the receiver, focusing on the beliefs and opinions of the audience and their attitudes and behaviors that can deter or support the success of a research project, and; the analysis of the channels of communication, which provides an overview of the media context and the formal and informal forms of communication that were used to send and receive information and that were used for communication planning. These analyses form the recommendations for communication approaches and messaging strategies that can be used to effectively communicate the value of transportation research.

These strategies and best practices were compared, as a result of Task 6, and are presented as recommendations in Chapter 6 of this report. In comparing strategies and best practices, we conducted secondary research using: (1) Internet searches of the Websites of twenty organizations to document the extent to which communicating research transcends non-transportation fields by identifying organizations in those fields and documenting their practices and tools for communicating

research, and (2) Internet reviews of relevant articles, publications, and other resources related to communication. These searches led to the selection and interview of seven successful organizations with exemplary practices in communicating research to gain deeper understanding of their processes, approaches, and tools on which they rely, and the analysis of the similarities and differences between the Task 5 findings and the practices of the organizations identified in the previous steps.

These findings from Task 6 contributed to the preparation of Task 7—an interim report that compiled the recommendations, in the form of guidelines, for best communication approaches to effectively communicate the value of transportation research projects and programs to agenda setters and decision makers. This report focused on theories and concepts of communication planning, but concentrated on the practical applications for specific audiences. These results and findings have been combined into a guidebook that the American Association of State Highway and Transportation Officials (AASHTO), state DOTs, other organizations, and transportation researchers can use to enhance their abilities to communicate the value of transportation research. This guidebook plots a communication strategy from audience identification to proper and effective messaging to implementation.

## **Report Organization**

This report has been prepared by compiling the technical memos and key findings of each task of the project, as well as the examinations of current communication practices (in the form of seven in-depth case studies).

Chapter One discusses the first two tasks, which included identifying the audiences of transportation research communication and interviewing these audiences and provided a framework of research on the audience and communication practices that followed.

Chapter Two details the context of the research project in relation to SAFETEA-LU and focuses on obtaining federal funding through communication.

Chapter Three examines our methods and criteria for selecting the seven case studies and identifies the case studies using both hard and soft science.

Chapter Four details the seven case studies selected and the communication practices used for each, identifying the project, the need for it, the audience, the communicators, the message, and the outcome.

Chapter Five analyzes the communication strategies and approaches that were identified in the first four tasks and combines them into an overall communication process and messaging strategy.

Chapter Six reviews the best practices of communicating the value of research and compares the different communication styles, channels, content, and audiences of each case study, specifically identifying successful practices, and also lists the organizational Websites we used in our secondary research.

# CHAPTER 1: AUDIENCE IDENTIFICATION AND RESEARCH-RELATED INFORMATION NEEDS AND COMMUNICATION PRACTICES

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## Introduction

This chapter addresses the objectives of Tasks 1 and 2 of this research effort. First, we identified the audiences of transportation research communication and those who need a better understanding of the value of transportation research (e.g., legislators, state departments of transportation, and the media). The focus was on identifying the wide range of potential audiences included in the framework of transportation research, including those who decide upon funding for a project to those who ultimately receive the benefits of a research effort. For each audience, we describe the information needs and preferred communication modalities.

Task 2 involved interviewing people responsible for justifying and explaining transportation research programs (both national and state) to determine the communication approaches and messaging strategies that have been used. Interviews on these topics with a wide range of individuals focused on assessing the successes of their approaches and strategies to communication and were used to fulfill both of Task 1 and 2 objectives. The information derived from these interviews is synthesized in the two tables that form the core of this section. The list of interviewees is provided at the end of this chapter.

The objective of the first task was to identify the wide range of potential audiences that might be included in the framework. This task asks and answers the research questions: Who sets the transportation research investment agenda? Who makes the investment decisions? Who are the beneficiaries of research? What are the relevant connections among them? How and when do the groups overlap? These are the groups/individuals who need a better understanding of the value of transportation research. These persons are basically the “receivers” of communications on the value of research. But answering these research questions is not straightforward. It is not always the actual decision maker (i.e., the elected or appointed official) who needs a better understanding of the value of research. Sometimes a key advisor really has most influence, sometimes it is the media, and other times it is the general public. The identification of audiences must consider the focus and process of decision making. The private sector might be an influential constituency. In other words, there is no such thing as a “general audience” for this communication.

Each of these audience segments sees a different value proposition from transportation research; therefore, each audience requires a separate message and message channel (i.e., communication medium) under the umbrella of a systematic and logical messaging strategy. We had to consider:

- Who are these individuals or groups?
- What do they care about?
- How do we best communicate with them?
- What influences decisions about implementing the results of the research?
- What are the value propositions of interest that connect research beneficiaries to desired outcomes?
- How does the outcomes and value propositions relate back to decisions about investments in transportation research?

We conducted outreach within the transportation research community and honed our target audiences and gathered intelligence on their needs and preferred communication modalities. In this task, we were interested in casting as wide a net as possible to ensure that we had identified all important decision makers and consumers, desired outcomes, and value propositions. To achieve this, we used snowball sampling, which relies on referrals from initial subjects to generate additional subjects; thus, the sample group appears to grow like a rolling snowball. Snowball sampling can produce in-depth results and can produce these relatively quickly. From these subjects, we were able to gather information on (1) who the audiences are, (2) how to position the transportation research product, and (3) how to communicate our positioning statements to the intended audiences.

## **Synthesis of Information Needs and Communication Approaches**

The following tables identify and describe the target audiences for communicating the value of transportation research; contains a framework with value propositions identified for each audience segment; and identifies preliminary communication strategies for each target audience member/group. The information was “vetted” in interviews with informants identified during the outreach noted above at conferences such as the annual or mid-year TRB conferences.

In order to conduct a systematic and detailed evaluation of “current” communications approaches and messaging strategies relevant to the goals of NCHRP 20-78, we conducted interviews with those stakeholders who are responsible for justifying, explaining, and sustaining transportation research programs at the national and state levels. These persons are the potential “senders” of communications on the value of research. The individuals included directors of the University Transportation Centers (UTCs), the TRB, federal agencies, and the Cooperative Research Program. From these interviews, examples of successful and unsuccessful communication approaches and messaging strategies for research investment decision making were identified. Success is a somewhat relative term, but for executing this research task, “success” is defined as a research project or program that has been funded and/or where the innovations developed through transportation research have been implemented or applied.

For each example of decisions about research investments, we started with the outcome (e.g., investment decision) and worked backwards, gathering information about communication approaches and planning. In doing this exercise, we were careful to sort out causality. Determining the effect of communications in the context of the many factors influencing the decision was an important objective of this task. In reality, the research investment decision-making process is complex; and it is hard to trace the cause-effect linkage. We discussed failures along the way as well as successes because even successful projects have had some failures or poor decisions in the life of the project. Thus we can learn from the approaches taken and strategies implemented.

The survey of “current” practices focuses on a description of the methods used and evaluation of the methods, and inventive or innovative strategies applied. We prepared a comprehensive list of issues that we needed to explore in the interview and sent it in an email communication to the interviewee, together with a letter of introduction describing the NCHRP project. We then followed up by telephone to schedule a time for a telephone interview. The research team developed a set of questions that were asked of the interviewees; while the interview itself was guided by these questions, it was an opportunity for the interviewee to “tell their story.” We asked for technical information on approaches, strategies, and methods and available data, as well as their perceptions on how their approaches differ from other research program managers or directors. The information was analyzed to identify and describe particular successes, problems, shortcomings, or deficiencies.



Table 1-1 presents information needs, preferred information formats, and preferred communication modalities of target audiences for research-related communications, such as Congressional members and staffers, State DOT Executives, Public Information Officers, and implementers. Table 1-2 contains the variety of communications approaches and messaging strategies that have been used by persons responsible for justifying or maintaining research programs. The information contained in Tables 1-1 and 1-2 were expanded upon as the study progressed and as the research team completed Tasks 4–8. For example, the findings related to the information needs of state DOT executives and implementers of the research were particularly limited at the onset of the research project. This information, along with insight derived from the case study research (Task 4), formed the data set analyzed in Task 5 to develop “Strategies and Tools” for communicating and selling the value of transportation research.

**Table 1-1: Audience Information Needs/Format and Preferred Communication Modalities**

<b>Audience</b>	<b>Information Needs</b>	<b>Information Format</b>	<b>Preferred Communication Modalities</b>
<b>Congressional Members</b>	<p>Important problem to be solved; research can contribute to solving the problem.</p> <p>Explain the up-front benefits to the constituency of the decision makers.</p> <p>What has been accomplished in the research programs—what the research spending gets them (Congress).</p>	<p>Attractive</p> <p>Short (one page)</p> <p>Main points up front</p> <p>Non-technical language</p>	<p>Written handouts or correspondence</p> <p>Newsletters</p> <p>Face-to-Face</p> <p>Phone (not cold calls)</p> <p>E-mail – once relationship is established</p>
<b>Congressional Staffers</b>	<p>Come with a “request.”</p> <p>Definition of legitimate issues that have broad consensus.</p> <p>Explain the up-front benefits to the constituency of the decision makers.</p>	<p>1–2 page leave-behind that is not quite a “white paper”</p>	<p>In-person meetings or gatherings – testimony at hearings; events or symposiums aimed at building rapport and exchange of ideas.</p> <p>A “plant” that can serve as an in-house resource on technical issues.</p>
<b>Media</b>	<p>Data or research that confirms or denies suppositions (such as studies that prove that more time in traffic is detrimental to health or productivity, etc.).</p> <p>Look for new elements to or new perspectives of an issue.</p> <p>Results should be compelling and timely. Provide main points and tell why it matters to the audience.</p> <p>Source determines the value of the research (inclined to look more closely at research from federal/state governments or from universities).</p>	<p>Executive summary</p> <p>Short</p> <p>Clear, non-jargon language</p>	<p>Press releases</p> <p>E-mails (with follow-up phone calls)</p> <p>Wire service</p> <p>Phone calls</p> <p>Copies of studies</p> <p>Personal contact with ability to provide access to someone who can speak to the research—critical to television media</p>
<b>State DOT Executive</b>	<p>Identification of best practices</p> <p>International scans</p> <p>Research that is directly supportive of business plan (important that researchers spend the time to understand agency’s needs and priorities).</p>	<p>Anecdotal success stories</p> <p>Illustrations of user benefits or cost savings</p>	<p>Print documents</p> <p>PowerPoint presentations</p> <p>TRB Presentations (primary sources for best practices)</p>

Audience	Information Needs	Information Format	Preferred Communication Modalities
<p><b>State DOT</b></p> <p><b>Public Information Officer (PIO)</b></p>	<p>Demonstrate how research is looking at innovative methods to save lives, conserve fuel, and increase efficiencies.</p> <p>Demonstrate value of research no matter who conducts the research.</p> <p>Explain benefits</p>	<p>Clear, to-the-point language</p> <p>Important points up-front</p> <p>Create products that PIOs can use to educate local officials and/or develop liaison between researchers and decision makers</p>	<p>Reports of research from other programs or transportation centers</p> <p>Brochures</p> <p>PowerPoint presentations</p>
<p><b>Implementers</b></p>	<p>Real need for behavioral (evaluative) research. What is important about the research</p> <p>Connections to legislative mandates</p>		<p>Attractive publications</p>

**Table 1-2: Communications Approaches and Messaging Strategies of Transportation Research Program Managers**

Research Program	Communications Approaches	Messaging Strategies
<b>Cooperative Research Program</b>	Anecdotal success reports (case studies) <a href="http://www.tfhrc.gov/pubrds/marapr98/shrp.htm">http://www.tfhrc.gov/pubrds/marapr98/shrp.htm</a>	Showcase research results; disseminate research impacts; process driven by customer needs with established program input channels from state DOTs (particularly chief engineers).
<b>TRB</b>	TR News bimonthly magazine, features timely articles on innovative and state-of-the-art research and practice in all modes of transportation.  Research Pays Off articles are periodically included in the Transportation Research News (TR News). Research Pays Off articles are summarized on a CD that is distributed to Congressional Staffers.	Anecdotal success reports (case studies).  Dramatic stories are powerful.
<b>Federal Agency</b>	Website populated with benefits of research.  Every research project has a report that is published, put into the public docket.  Publish or present technical papers at conferences to share information so the public knows and the manufacturers get an idea of the research activities.  Press releases through the Public Affairs office.  Internal (to agency) briefings on research findings and conduct an annual review of research.  Demonstrate first-hand to Congress members and staff new technologies in the field.	Be visible, show results and success stories.  Show ROI over time to show the results of research.  Show research is tied directly to and adds value to the agency's mission—build the business case for research—this research led to this product with this result.
<b>University Transportation Center</b>	Short written progress report sent in response to a request from Representatives in Congress—part of regular stream of direct and indirect communications of work of center to congress; close relationship with Congress member (Congressional members will listen to someone from their state).  Submit language to be included in the House's version of a reauthorization bill.  Communicate activities and achievements via the media or the Web to political leadership.  Presentations on the Hill; invitation to conferences.  Use TRB to communicate.  Research results on regular basis in meetings with local delegation, congressional members and staffers in DC.  Newsletter and other regular updates.  UTCs benefit from being a group and identifying and pushing broader policy goals instead of goals associated with a single center. This brings a bigger power sweep for national policy.	Need for the research, general economic benefit to be produced. Activities and achievements in all dimensions (research, service, education), specific capabilities of center.  Links problems to solutions that are understandable and practical.  Success stories from the research—achievements, implementations, and impacts and present them in layman's language.  Innovative ideas; move at pace of business.

Research Program	Communications Approaches	Messaging Strategies
<p><b>Industry Association</b></p>	<p>Media, Website, annual meetings, networks, position papers.</p> <p>Face-to-face meetings with members of Congress or their staff face-to-face; provide information—there is no substitute for this.</p> <p>Work with university researchers to provide research-based information.</p> <p>Newsletter to brief board, Congress, and constituents.</p> <p>Have data, have examples—but nothing that takes more than a few minutes of someone's time.</p> <p>Initiate and support public advocacy at the federal and state levels.</p> <p>Awards program at annual meeting—a way to show all the good work.</p> <p>Use clear picture, graphical examples, clean, simple, consumable analogies and metaphors.</p> <p>Lunch meetings with Capitol Hill staffers during annual meeting.</p> <p>Engage the media.</p> <p>Use technologies (like podcasting and YouTube).</p> <p>Deal with staffers.</p>	<p>Future needs a compelling statement with a champion to deliver it.</p> <p>Talk to a communications firm to get the best ways to convey your message.</p> <p>Describe transportation research landscape, outline past accomplishments, what could be done, recommend funding levels.</p> <p>Tell a story to put the issue on the table about the problem, needs, cost, and timeframe.</p> <p>Success stories TCRP research; value of selected research projects—specific examples—tracks the implementation and outcomes of transit research.</p> <p>Focuses on the “value” mainly cost savings that have come from past research. Does not “sell” specific future projects.</p> <p>Keep message simple – Use language people can understand.</p> <p>Push for a single, unified agenda. Look at national interests and trends.</p> <p>How research benefits the public— saves lives, saves an hour in commute.</p> <p>Core messages – congestion is worsening and this impacts economy—we become less competitive, lose jobs, and eventually, industries.</p> <p>Diversity of voices and lots of re-iteration of the message.</p> <p>Show how products are made better, cost less, the number of students trained, and the jobs supported by research.</p> <p>We are interested in research so we can do things better, faster, cheaper.</p> <p>Tell Congress – I'm a constituent— don't take too long. Make it clear what you are asking for.</p> <p>Do your homework, know the staffers, be conversational.</p>

## **Persons Interviewed**

William Buechner, Vice President Economics and Research, American Road and Transportation Builders Association

Nicole Burris, CTC, Deputy Director, North Carolina DOT Communications Office

Pat Casey, CTC, Communications Consultant to Wisconsin DOT

Rod Diridon, Executive Director, Mineta Transportation Institute, San Jose State University

Richard J. Dolesh, Director of Public Policy, National Recreation and Park Association

Keith Esparros, Assistant News Director, NBC 4 (Los Angeles)

Michael Griffith, Director, Office of Research and Analysis, U.S. Department of Transportation, Federal Motor Carrier Safety Administration

Barbara Harsha, Executive Director, Governors Highway Safety Association

Graham Hill, former Staff Director and Senior Counsel to the United States House of Representatives' Transportation and Infrastructure Subcommittee on Highways, Transit and Pipelines, currently Chief Executive Officer, ICE Miller Strategies, Inc.

Patrick Jones, Executive Director, and Neil Gray, Director of Government Affairs, International Bridge, Tunnel and Turnpike Association

Dennis Judycki, Associate Administrator, Research, Development and Technology, Federal Highway Administration (Turner-Fairbank Highway Research Center)

Tony Kane, Director of Engineering and Technical Services, American Association of State Highway Transportation Officials

Joseph Kaniathra, Associate Administrator, Vehicle Safety Research, National Highway Traffic Safety Administration

Jennifer Kunde, Lobbyist, Director of Government Relations, Northwestern University

Bruce Layton, Lobbyist, Special Assistant to the President for Government Relations, Northwestern University

Dan Machalaba, Transportation Reporter, Wall Street Journal

Scott Magruder, Nevada DOT Public Information Officer

Mike Merle, News Operations Manager, ABC 7 (Los Angeles)

William Millar, Executive Director, American Public Transit Association

Lee Munnich, Senior Fellow and Director, State and Local Policy Program, Humphrey Institute, University of Minnesota; also Subcommittee Chair, Congestion Pricing Outreach

Dan Murray, Vice President, Research, American Transportation Research Institute (ATRI)

Ann Overton, CTC, Public Affairs Manager, Virginia Transportation Resource Council

Neil Pedersen, Administrator, Maryland Department of Transportation's State Highway Administration

Peter Peyser, Lobbyist, Blank Rome Government Relations

Robert (Bob) Plymale, Director, Nick J. Rahall II Appalachian Transportation Institute, Marshall University

Bill Reichmuth, Chair of American Public Works Association's Transportation Committee and also Director, Planning, Engineering & Environmental Compliance, City of Monterey, CA

Robert Reilly, Retired Director, National Cooperative Highway Research Program

Shelley Row, Intelligent Transportation Systems, U.S. Department of Transportation

David Schulz, founding Executive Director, Northwestern University's Infrastructure Technology Institute

Neil Schuster, President and CEO, Intelligent Transportation Society of America

Jonathan Upchurch, former Congressional staffer, currently, National Park Transportation Scholar, National Park Foundation

Eric Weiss, Transportation Reporter, *Washington Post*

## CHAPTER 2: RESEARCH-RELATED COMMUNICATIONS EFFORTS LEADING TO PASSAGE OF SAFETEA-LU

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### Introduction

This chapter describes and assesses communication efforts to promote investment in transportation research programs during the passage of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). This information was obtained through interviews with 24 individuals who played, and continue to play, diverse roles in funding and/or directing transportation research programs in the United States. They include congressional staff, lobbyists, research program managers, university staff and research center directors, and stakeholder group representatives.<sup>1</sup> They largely discussed the communications activities that they undertook, were aware of, or were associated with during the passage of SAFETEA-LU. But because of their diverse roles, backgrounds, and perspectives, they contributed unique and varied insights concerning the relative significance and effectiveness of these efforts and activities. This chapter also draws information from reports, articles, and other publications on SAFETEA-LU. Based on this research, we identified the shared attributes of the communication efforts and summarized some general lessons from those commonalities.

### Background: SAFETEA-LU Passage

This chapter focuses on policy advocacy communications. Policy advocacy can be defined as disseminating information intended to influence legislation and the passing of certain laws by targeting policymakers. We were interested in the advocacy communications efforts that influenced the funding of research programs in SAFETEA-LU and the level of funding that the programs received. SAFETEA-LU, signed into law on August 10, 2005, authorized a total of \$286.5 billion in spending for federal fiscal years (FFY) 2004–2009. Of this total, \$42.30 billion covered obligations that actually took place in FY 2004, which left \$244.15 billion for the other years covered by the bill (FFY 2005–2009).

### Funding Issues

This chapter is particularly focused on the advocacy communications efforts to influence the contents and funding levels associated with Title V of the legislation—Transportation Research. Funding for Title V programs totaled \$2.149 billion or about 1 percent of the total funding. The federal role in these Title V programs is primarily administered or overseen by the Federal Highway Administration (FHWA), Federal Transit Administration (FTA), National Highway Traffic Safety Administration (NHTSA), Federal Motor Carrier Safety Administration (FMCSA), and the Research and Innovative Technology Administration (RITA). Provisions in Title V cover short-and long-term research, technology, training, and education programs; the Bureau of Transportation Statistics (BTS); Intelligent Transportation Systems (ITS) research and related activities; and most of the University Transportation Centers (UTC) program.

The transportation research programs that were funded and the level of funding each program received were the result of the convergence of several factors, some planned and some serendipitous—a “perfect storm” of forces and influences. One of the main lessons of this study is that the outcome of any one organization’s advocacy is not completely predictable. For instance, most of the universities that hosted UTCs put non-tax funds into a pool managed by the Research,

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<sup>1</sup> To protect confidentiality of interviewees, statements are not attributed to individuals.



Education, and Training Reauthorization Coalition (RETRC) to retain a lobbyist to facilitate their advocacy for increased funding for existing UTCs. However, what resulted was an increase in the number of UTCs rather than the increased funding for existing centers that they were seeking. Such results characterize what is referred to as “serendipitous ripples.”<sup>2</sup> These are outcomes that resulted from multiple simultaneous processes not anticipated by participants in any single action. The consequences of SAFETEA-LU affected many individuals and groups throughout the transportation research community, presenting opportunities for learning ways to approach the next reauthorization process.

In the case of SAFETEA-LU, the reauthorization debate took place over two years and 12 extensions—a period of time long enough for significant issues to percolate until the time of action on the part of Congress. In fact, the final eight weeks prior to the signing of the law were characterized by a flurry of political activity. In some ways, what happened in terms of SAFETEA-LU legislation was a continuation of recent trends—dramatic growth in earmarking and politicking to balance donor-donee considerations.<sup>3</sup> Crafting any bill requires balancing many required elements. Some of these have political tones but there is often straightforward mathematics involved as well, and both the political and mathematical processes must be understood. The policy and communication analysis must begin with how the mathematics constitute the “playing field” that defines what is possible.

### **Shaping the SAFETEA-LU Discussion**

Most interviewees in our study shared the common idea that the SAFETEA-LU debate was primarily shaped by two interrelated issues: (1) the total size of the funding pool and (2) the formula by which that money would be distributed among the states. The former issue was political, and the latter was political and mathematical. The total size of the funding pool was closely linked to the revenue stream provided by the Highway Trust Fund (HTF), which is funded by fuel taxes. Going into the reauthorization debate, there was uncertainty about the long-term outlook for the financial health of the trust fund. The last increase on the fuel tax occurred in 1993, and during the passage of SAFETEA-LU the Bush Administration was adamantly against current or future fuel tax increases. The sum of the states’ funding requests were much above the available funding, and when combined with the minimum return guarantee and other basic structures made the SAFETEA-LU discussion in Congress both a mathematical and political exercise, and more than simply a donee versus donor state issue. One way to do this was to consider increasing the overall funding pool by a significant amount (since donee states could not be reduced) to bring donor state shares to a level that would be acceptable—in other words, giving more money to all states but giving even more to donor states.

### **Communicating with Congress about Research**

The information gathered is based on a limited number of interviews and other secondary research related to the passage of SAFETEA-LU. It cannot represent all of the communications activities that occurred related to the Research Title in SAFETEA-LU, but our analysis does point out common challenges and illustrates a range of possible solutions to these challenges. As reflected in the list of interviewees, our report is based on interviews with persons on the Hill, within stakeholder associations or lobbying organizations, and in federal, local, and state agencies or at universities who are responsible for funding, directing or justifying research programs. The common threads among, or attributes of, effective and not so effective communications strategies are provided below.

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<sup>2</sup> Pippa Hall (2001). “Serendipitous Ripples: Unexpected Outcomes of a Palliative Care Educational Project.” *Journal of Palliative Medicine*. Vol. 4, No. 3: 345–352.

<sup>3</sup> Donor states receive significantly less federal highway aid than their highway users pay in federal highway taxes to the Highway Trust Fund (HTF); donee states receive more federal highway aid than they pay in taxes.

## Communicating National Values of Research

Interviewees who were knowledgeable about what it takes to be “heard” on the Hill said that it was essential to communicate a broad vision and national message theme that illustrates the value of research to constituents and local agencies. Several interviewees mentioned that chances for success were enhanced if the many diverse voices throughout the transportation community articulated the overall value of research in ways that made it easier to support research than other programs. Congressional staff are bombarded by many requests, thus it is easier for them to support programs that benefit the most number of people. It is important to provide answers to questions such as: What is the value? What relation does the research have to the current problem? What have previous projects and programs achieved? What are some effects of these previous research projects?

It was important to come across as advocating “for the greater good and not to promote *pet* interests or narrow agendas.” It is necessary to point out that grand vision does not mean selling a complex research product. Interviewees spoke of fielding visits from “effective” lobbyist and interest groups—most came with the broad, consistent message, “we think investment in [research program] is important [for these reasons].” But some groups would come with their own agendas, which would be a “turn-off” to Committee chairs and members because these groups “reached too far or got too greedy.” A real-world example of this was one company that provided real-time travel information services. The firm wanted to grow the number of cities it served. Representatives went to the Hill to promote the value and benefits of what they do and to ensure that there was funding in the bill to cover this type of service. But they went too far—they even identified the amount of funding they wanted and the actual program that should serve as the source of their funding. This was not well received.

On the other hand, the role of the American Association of State Highway and Transportation Officials (AASHTO) in promoting investment in research was a positive example of communicating a broad vision. It was mentioned several times that Congressional staff listened to what AASHTO had to say. AASHTO represented the various state DOTs; therefore, the association was not perceived as having a conflict of interest (i.e., as in actually conducting the research for which it was seeking funds). AASHTO’s Standing Committee on Research (SCOR) was identified as having credibility with the Congress because the states are contributing their own real money to this research program. The states are not in the research business themselves so when they say, “take some of our money, spend it on pooled research, so we can do our jobs better...” this sends a significant message. Since it was pushing a “single” unified agenda for the states, the organization was perceived as credible. When seeking feedback on the bill, for instance, staffers would not go to individual state DOTs because the DOTs were represented by AASHTO. Staffers would just seek feedback from AASHTO, a matter of one-stop shopping. More broadly, with its ties to the states, AASHTO represented the governors and the voters—the ultimate constituency of the Congress.

### Broad Coalitions

The first theme, communicating a grand vision, underscores the importance of building broad coalitions to promote a clear message to Congress. It is important to get as many people involved as possible; reaching out to committees and individuals on websites, through mailing lists, with follow-up meetings, and with face-time at related meetings will get the ball rolling. The advocacy communication efforts of those individuals who were satisfied with the outcome of research programs were implemented by broad coalitions that targeted both Democratic and Republican policymakers, spanned political ideology from the left to the right, consisted of grassroots as well as DC-centric organizations, and leveraged the reach of public, private, and academic interests. As one person mentioned, “[my program] creates a strange bedfellow coalition. We worked both sides of the

political fence.” Another interviewee said, “You need to have allies to do this kind of thing.” Several examples of these broad coalitions were identified. To build support for the Transit Cooperative Research Program, a broad constituency of universities, industry associations (including the American Public Transit Association [APTA]), and FTA representatives came together. As another example, in the late 1990s FHWA, along with AASHTO and the Transportation Research Board (TRB), convened the National Highway Research and Technology (R&T) Partnership to engage the full transportation community in identification of research and technology needs and to create a common vision for a long-term highway research program. This output of this partnership was a report entitled *Highway Research and Technology: The Need for Greater Investment*.

### **A Success Story**

Perhaps the best example cited among our interviewees was the coalition developed to advocate for a formal freight research program. The “Freight Stakeholders Network” built a broad consensus and uniform support for a National Cooperative Freight Research Program (NCFRP) to be administered through TRB. Their approach was strategic, not haphazard. They cemented their message of the need for a formal freight research program early on through grassroots networking and consensus building out in the field (i.e., among local, regional, and national (not Federal) stakeholders). They characterized their advocacy campaign as a rifle, not a shotgun, approach. They were satisfied with the manner in which NCFRP was dealt with in SAFETEA-LU and thought a factor in their success was that they brought a diverse and broad constituency on-board early so “everyone was speaking from the same sheet.” The coalition included research institutes, private sector, public sector, and academics. “It was not all government; not all industry; it was a diverse mix. We had a long leash to tell our story.” The Freight Stakeholders Network wanted to make sure that whoever Congressional staffers were to call for information about the formal freight research program, that person would communicate the common message. They went to Congress with one agenda; they got everyone who had an interest in freight research on their side.

It is also important to point out that that because it was such a broad constituency, they did not rely on just a single advocacy method. Their methods included informal communication across industry and multimodal networks; the formation of semi-formal networks of experts and consultants (private sector associations) that would provide information on Capitol Hill; and the writing of position papers for delivery at meetings. The stakeholders did not push funding levels—they wanted to get the program going—not direct how much money was needed. They were willing to leave that up to the US DOT, and their Congressional supporters.

Why was a broad coalition a necessary factor? It (1) added credibility to the effort and got attention, (2) enabled the advocacy campaign to highlight many different facets of the issue and increased its relevance and significance, (3) allowed the coalition to formulate a policy agenda that balanced different perspectives and be more politically acceptable, and (4) facilitated advocacy from multiple parts of the policy spectrum, bringing different contacts and resources to the table, and making it possible for the coalition to target a wider range of policymakers. The Freight Stakeholders Network appeared to be successful in each of the criteria.

### **Not the Only Criteria for Success**

Not all coalitions are successful. There were factors that differentiated effective from ineffective coalitions. Most notably, it was important that the coalition identify a “common” goal that was of significant value to each participating organization. This was certainly a factor in the success of the Freight Stakeholders Network and perhaps, less so in the National Highway Research and Technology (R&T) Partnership. The common approach needed to converge around certain agreed

upon objectives. It took organized leadership—as a focused core surrounded by a wider group of supporters—to bring about the common goal. When this did not happen, success was modest if at all.

For instance, the Council of University Transportation Centers (CUTC) considered their success modest in terms of SAFETEA-LU outcomes. In the late 1990s, most of the Universities that host UTCs cooperated to create RETRC in preparation for the reauthorization of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). RETRC was reactivated during the two years preceding SAFETEA-LU. During 2003 to 2005, RETRC and CUTC's "Strategic Partners" (AASHTO, APTA, and others) advocated for more funding for the established UTCs. Although there was a substantial increase in funding for new, earmarked centers, the UTCs did not get what they wanted. We speculate that one factor in their modest success might be the fact that UTC funding was not at the top of the priority list among the Strategic Partners. They were not speaking to achieve a common goal with the UTC program. The incentive for members of Congress may have been to create more "winners" rather than "bigger winners." After the growth in the number of centers, CUTC leadership believes that a formulating a common goal among the UTC community in anticipation of the next reauthorization may not be possible now that a broad and diverse population of universities is interested in UTCs.

### **Strategic and Flexible Planning**

The strategic plan should be developed with the goal in mind—coalesce professional opinion around an important vision and a plan that provides a campaign structure that convinces Congressional representatives that research is an important issue that deserves support. The goal is not to use the plan itself to communicate with staff or representatives.

One of our interviewees recommended that a national transportation research blueprint is needed prior to the next reauthorization. "Does a Congressional staffer know where to go for a national research blueprint?" Among other things, national transportation research architecture would inform how proposed research projects would fit rationally in the scheme of things. It would provide cohesion, clarity, and a strategic vision. "If this was more cogent and clear it would be harder for Congress to earmark projects that don't meet the criteria." This recommendation underscores the significance of strategic planning in effective advocacy campaigns.

While one would assume that systematic planning and evaluation of efforts would be a natural fixture in such campaigns, the reality was that strategy was often absent. Some coalitions did involve strategic planning early on—the Freight Stakeholders Network and CUTC are examples. These coalitions spent some time to develop a shared perspective and find common ground to orient their efforts. This common ground provided a strategic space for these groups that proved useful throughout their advocacy efforts. Even if no formal strategy was articulated, coalition members had a clear sense of the group's objectives and how they could contribute to them. A particularly effective advocate for one research program said, "as soon as reauthorization began we identified key people on the Committee and key staff—each caucus. We did the early work to get all our constituents on the same page philosophically and strategically. At the tactical level our work was planned and coordinated. Then, we just went ahead and started talking to people—communicating our shared message."

Defining a strategic space gives coalitions flexibility of action, which is useful because the role and objectives of the coalition can change over the course advocacy efforts. Henry Mintzberg, in the *Rise and Fall of Strategic Planning*<sup>4</sup> differentiates between strategy formulation and strategy formation.

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<sup>4</sup> Mintzberg, H. (1994.) *Rise and Fall of Strategic Planning*. New York: Free Press.

Strategy formulation is a formal, goal-driven planning process—actions and programs are directly derived from higher-level goals and strategies while strategy formation sees strategy as a pattern or theme that surfaces organically as the many parts of an organization respond to the environment. Advocacy and dealing with the Hill requires strategy formation. As one interviewee admonished, “Players/issues change—you have to be adaptive.”

Strategy formation does not work well within hierarchical coalitions or organizations. One interviewee speculated that the militaristic structure at FHWA might be why the FHWA research budget was not supported on the Hill. All of the contact with the Hill had to go through the Administrators or the policy office. Thus, the substance and style of communications between FHWA research program managers and Congress were hindered. “Perhaps members did not feel the FHWA program was responsive to their sense of the needs.” “Administrators were not going to defend \$11 million for [research program] when they have bigger fish to fry (i.e., Highway Trust Fund; minimum guarantees).”

### **Messaging Strategies**

Effective advocacy relies on specific messaging strategies. For some coalitions, the primary advocacy tool was the provision of research-based information. “We’re always looking for opportunities to brief Congressional members. We just keep trying to educate people.” One stakeholder association representative said that all the information they provide to Congress is based on research; the vast majority of which is done in partnership with academic institutions. The organization believes that this adds credibility to its communications with Congress. “Facts will get your issues heard.” It is important, however, that the communications are not overly technical, but basic in their message. “We’ve done wonderful things and have the technology to do even more with additional funding,” one interviewee suggested, to stay positive but not too detailed. In its communications with Congress, NHTSA focuses on three key points (i.e., its mantra)—lives saved, injuries prevented, tax dollars saved. In this aspect, NHTSA is “framing” the highway safety issue to two core values—life and public accountability. In support of NCFRP, as another example, advocates documented how inadequate freight data and freight analysis were at the MPO level—and the importance of un-congested freight movements to regional economies—thus framing freight research as economic opportunity.

### ***Messages with a Meaning***

In *The Tipping Point*,<sup>5</sup> Malcolm Gladwell writes about the importance of “sticky” messages, i.e., messages that stay with people, are frequently discussed or passed on to others, and, eventually have an impact. Sticky messages come from positioning an issue in a novel or inspiring way. Several of the interviewees talked about reframing and repositioning their issues to create a connection with the Congressional audience. In this way, research to mitigate congestion becomes not just a local issue but a national and multi-state issue. Freight research is not just about trucking but is also looked at from a multi-modal perspective. The National Cooperative Highway Research Program (NCHRP) tells the story of research outcomes and impacts in language the decision makers can understand—not in “researchese.” One of our interviewees spoke about a paradigm shift that was needed in competencies and perspectives of engineers. He painted the picture of two different types of engineers: “Eisenhower engineers” and “new engineers.” The “Eisenhower engineer” builds roads; the “new engineer” connects the dots between transportation and contemporary social and economic issues, such as economic development, quality of life, or national security.

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<sup>5</sup> Gladwell, M. (2000). *The Tipping Point: How little things can make a big difference*. Boston, MA: Little Brown.

## ***Two-Way Communication for Ongoing Influence***

Providing new, research-based information and expert analysis to Congress to help the members understand an issue or the rationale for investment in research has another tangible benefit that is tied to the concept of “influence.”<sup>6</sup> According to sociologists, one of the most widespread and basic norms of human culture is embodied in the rule of reciprocity. This rule requires that one person try to repay what another person has provided. This sense of future obligation makes possible various kinds of continuing relationships, transactions, and exchanges that are beneficial. We saw this rule at work in the two-way communications that took place between Congressional members/staffers and UTC directors, lobbyists, stakeholder associations, transportation agencies, etc. Interviewees mentioned that staffers’ level of expertise on transportation issues, and particularly transportation research issues, will vary considerably, depending on the committee assignments of the legislator and the tenure of the staffer. Because, as one interviewee mentioned, turnover is high with Congressional staffers, many staff members have been in their positions for only a short period of time. Very few House Transportation and Infrastructure Committee staff who worked on SAFETEA-LU are still there now, meaning that in the next reauthorization, new staffers will appreciate efforts of advocates to explain complex transportation issues in easily understood terms. By providing information support to members of Congress and their staff, the research community builds its credibility and establishes a basis for exchange when the next authorization round comes. Keeping communication constant between majority and minority staff members, and knowing who is in charge and who works for whom proves to be immensely beneficial and keeps researchers in the loop.

All interviewees commented, in one way or another, that ongoing communication between decision makers and researchers was important. “You need to build communications over time. You can’t do enough communicating with Congress. Issues can get lost in the shuffle.” It is not the only way to get research support, but it can be an effective way. “What is more important than the communication mechanisms used is whether you have a history (foundation) of successful research and whether that is being communicated to policy makers. If you don’t do things that are relevant, that provide a benefit, and communicate that benefit, then, you won’t be successful in seeking funding.” Congressional staff and members of Congress needed to have confidence that there was an important problem to be solved, and that the requesting agency could solve it. One important role for the proposing research entity was to show that research may or can contribute to solving the problem. Thus, communications for this purpose needed to be non-technical and practical—to link problems to solutions in a clear and simple way.

## ***Consider the Interests of the Audience***

The recommendation that messaging strategies should “consider the audience” is absurdly simple; however, it is not always followed. The “ask” and the rationale for it need to be tailored to the current political mood and concerns of the specific policy makers. Effective advocates demonstrated the connection between what was being requested and the interests of the member’s constituency. Using clear and concise language and specific examples, such as percentages and cost, kept the topic relevant to the audience. “Congressional members are not interested in the theory of [your issue] but in how it benefits their constituents. Whenever you visit the Hill, they expect you to ask for something. We went in and talked about what we were working on, why it’s important, and why a Congressional member should be interested in it,” said a university-based researcher, advocating for a national research program. The message should also contain information on why government should contribute funding, or in some cases lead and coordinate a particular effort (i.e., the Vehicle Infrastructure Integration (VII) project is an example).

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<sup>6</sup> Cialdini, R. (1984). *Influence*. New York, NY: Morrow.

### ***Importance of Illustrative Success Stories***

Case studies, in the form of anecdotal reports, were an opportunity to showcase research results in a way that makes the connection with constituencies. As one interviewee aptly phrased it, “a handful of dramatic stories is powerful.” This is not a technique that is unique to advocacy communications. Knowledge management experts have been promoting the power of “stories” to inspire innovation, change, and professional breakthroughs. Stories can communicate a large volume of emotional content in a short time to quickly resonate with the target audience. Success stories can speak directly to the needs of Congressional members much more than efforts to document the aggregate value of research programs—as in a cost-benefit approach. More than one interviewee mentioned the relevance of TRB’s “Research Pays Off” published in *TR NEWS*. One person described how he would select stories that staffers would connect with—a success story from Research Pays Off from Nebraska DOT would be sent to the Congressman from Nebraska. But, it was mentioned that TRB staff has to “beat the bushes” for examples—researchers and their customers rarely offer good examples. It was suggested that researchers (engineers) are reluctant to make claims about their results because there are always some unanswered questions. Decision makers do not work this way: they act on much less evidence or certainty.

### **Relationship Building**

Many of the people interviewed noted the value of having access to decision makers or at least having an ally in the decision-making circles. This attribute might even be the lynchpin of effective advocacy. “I had a very close working relationship with my congressional delegation. Our congressional members listened to us.” One individual went so far as to say, “This is all about relationship building.” Direct contact with the members, themselves, was important. There was no substitute for face-to-face meetings with staff or Congressional members.

Universities have multiple advantages over federal agencies or other stakeholder associations in the realm of relationship building.

- First, virtually every large university has a full-time paid lobbyist, sometimes several that assist with many university needs. These lobbyists help move forward programs the institutions are working on, inform the Congressional members and staff on what the institutions are doing and have done, and generally keep connections with the Hill.
- Second, Congressional members often have a natural connection to or confidence in their local universities. It is their alma mater or the home-state university.
- Third, at the end of the day, Congressional members want to know that they did something for their state. Bringing money back to the districts is important.

These three advantages provide relationships, a constituent-focused benefit and takes advantage of the expertise (lobbying) that is required in ways no different than those needed in the planning, design and operation of the road network.

Testimony at hearings does not constitute effective relationship building. Usually at such testimony only about half of the committee members (or staff from those members offices) or staffers from that committee attend. Many times hearings are just for show (i.e., lip service). What is the most effective mechanism? Many interviewees identified “building a rapport with the staffers.” ITS America was singled out as being very good at this. They held events to which they invited staff and members of Congress. One such visit was a field trip to a traffic operations center operated by VDOT that was very well attended by staffers. Another example cited were luncheons hosted by the University of Minnesota on Capitol Hill. These luncheons typically had no strong agenda but

allowed an exchange of ideas—even among House and Senate staff, which are not often in the same room. The Texas Transportation Institute was also mentioned as representing the “power of effectively developing a rapport with Congressional staff and then using that relationship to get across a message.”

Effective relationship building is cultivated in several dimensions. One UTC director talked about his extensive local political connections; personal relationships with Congressman; how he responds quickly to Congressional requests for technical information on transportation issues; and how he widely publicizes (through the media and the Web) the center’s activities and achievements to political leadership. He talked about this as a routine communication process; not specifically tied to earmarking for particular projects. He believes, “relationships need to take on this type of personal connection to be effective.” Another person mentioned, “You can’t make cold calls.” One person who has built long-standing relationships said, “Staffers who are comfortable with you and who trust you will take time to listen to you. It is very subtle “marketing” and it takes time. You can’t be seen as being self-serving.”

### **Working from Within**

More than one interviewee mentioned that it is critical that advocacy is done by individuals who understand the inner workings of Congress and the Administration and know how to “play the lobbying game.” Such individuals understand the political realities that policymakers face and work within those parameters to secure their support. “There are critical times in the legislative process at which you need to communicate with staff. So you have to be aware of the legislative schedule—know what’s going on. We watch things on the Hill to make sure things don’t happen to prevent [our program] from being supported.” The best-case scenario would be to find a legislator who could be a champion—an elected official who will talk to other elected officials. For example, one of our interviewees described how support was built for a program in his state. “We put together a task force of elected leaders; if they are leading these things, they become converted.” In order to find the champion, it is important to convince legislators that the issue is significant enough to provide an opportunity to display their leadership, yet has enough support that the political risk of their championing it is minimal. Lawmakers are looking for low-risk, high-return investments on their political capital.

Others talked about the usefulness of having an “embedded” transportation research professional on the Hill. This person can serve as a resource to congressional staff. Congressional staffers often have no technical background relating to an industry, such as transportation; their education is often in law or political science. So communicating with them is often approached as with a lay person. USDOT will sometimes detail employees to help congressional staff. A state DOT could also detail someone to work on that staff. One of this NCHRP project’s panel members, Jonathan Upchurch, served a rotation as congressional staffer. He was named an American Society of Civil Engineers (ASCE) fellow in 2002 and went to Capitol Hill to work on re-authorization. He was staff to the Highways and Transit subcommittees, Transportation and Infrastructure Committee (House) and served as a resource and advocate for transportation research from within. Not just Upchurch but others mentioned that such individuals are welcomed in Congress to sort out the technical substantive issues. Their role is to provide sound, objective advice to maintain credibility so staffers and Members continue to use them as a resource. But at the same time, they can serve as advocates for transportation research. But Upchurch admitted that his advising went out the window during the 11<sup>th</sup> hour conference committee deliberations in which earmarking took place.



## Conclusions and Issues for the Next Reauthorization

This chapter described and assessed the activities (i.e., political, mathematical, and communications) that influenced investment in transportation research programs during the passage of the SAFETEA-LU. The lessons learned from this experience can benefit many individuals and groups throughout the transportation research community in planning and implementing advocacy communication activities for the next reauthorization. One of the main lessons of this study; however, was that the outcome of advocacy communications is not completely predictable; regardless of how strategic and well thought out the communications with Congress are. Legislative outcomes are the result of the convergence of several factors, some planned and some serendipitous—a “perfect storm” of forces and influences. By creating strategic space, an agency can build flexibility of action to better weather the storm. In addition to providing lessons learned for the transportation research community at-large, this paper provides our NCHRP research team with a set of factors, issues, and concepts that need to be more fully examined in subsequent research tasks. In particular, these themes will be explored in the case study research, for which we will conduct in-depth evaluation of communication activities associated with several transportation research projects—from inception through funding toward implementation. In the spirit of fulfilling both of these objectives, the bullet points below present our key findings as they relate specifically to the SAFETEA-LU experience and also as they related more generally to research-related communications.

### SAFETEA-LU Lessons and Relevant Issues for Legislative Processes

- Reauthorization is a political process. Next reauthorization will be dominated by one major issue—How are we going to fund the future transportation system? The Highway Trust Fund surplus balance will run out in the sixth year—forcing Congress to increase taxes to grow the program.
- Research as a general rule does not have an advocate when and where budget decisions are made. There are more pressing needs, better cases, and more important ways for Congressional members to serve constituents. That does not mean Members do not care about research, but there are many competing priorities for their time and support.
- The key is not really what the amount of Research funding is, but getting programs and projects as budget lines and ideas into the legislation.
- The Basics of the legislation are determined between 2-1/2 and 1-1/2 years before the bill is passed by Congress. This is the time when information is the most valuable and necessary.
- The Conference committee is significant. It needs to include someone (a champion) who wishes to have funding spent on the Research Title. The Conference is too intense, too short, and there is “no oxygen” in the room for anything other than the most important elements. If research is ignored, it will be easier to take funds from it. Squeaky wheel still gets the grease. The goal should be to ensure that there are several informed people at the negotiations who care about research. This means taking the time now to find out who they are and what topics they care about.
- One thing about SAFETEA-LU passage, there were more advocates for transportation research than for previous bills. It will be important to maintain at least this level of interest and investment so transportation research does not get a smaller share of the pie next time around. The level of awareness of importance of transportation research needs to be raised with Congressional members. Transportation researchers at all levels (e.g., local, state, national, and Federal) to be willing to build relationships with local offices of members of Congress and with their DC-based staffs.
- The extensions of TEA-21 (over the course of 7 fiscal quarters) put a great deal of pressure on the Research Title. The extension funding was made in the same proportion as in TEA-

21. The funding, however, contained no earmarks and contained a greater percentage of apportioned programs than would have been available in the final bill. Later, when the bill reached conclusion, legislators did not want to give up earmarks, but they had to be spread over 5 fiscal years (one quarter of FY 05 and FY 06, 07, 08 and 09) instead of six, raising their relative effect. They were included in the Scope and Minimum Guarantee calculations, but this put more pressure on the Research Title and other discretionary funding.
- The Democratic Party Congressional leaders have promised to make the process more open in the future, but there does not appear to be support for completely eliminating earmarks.
  - The funding in the Research Title is equivalent to one percentage point in the minimum guarantee percentage calculation. At this level, considering the importance of the donor-donee issue, there will be pressure to earmark the Research projects in the future. This is not a value, or political, judgment; it reflects the mathematics of the Scope and minimum guarantee equations.

### **General Observations on Improving Research Communication to Congress**

- Research communications to Congressional officials should be jointly planned by the research community at-large, comprised of consistent messages that are easy for the layman to understand, and carried to officials by individuals who have a working knowledge of Congressional mechanisms and who are capability of building relationships with Congressional members and staff.
- Coalitions are important. A wide base of advocates for a research program convinces legislators that there is political safety in supporting the program; the more diverse the support network, the easier it is to increase the overall relevance and significance of the research program in the political priority list and the wider the reach of the group in term of access to policy makers.
- Investment in research always needs to tie back to the ultimate reasons it was useful Congressional constituents (i.e., reduce congestion, save lives, create jobs, etc). “Hit this hard and hit it often.” Advocates should focus on performance measures that show savings of time, lives, and money—these are messages that resonate with legislators, agencies, and the public. Programs that affect state DOTs are also key to influencing the research investment—maintenance, remote sensing of pavement conditions, safety, etc.
- The UTCs do better because they provide immediate, positive feedback to Congress members on the use and value of their research funding, and there are “focused” winners in the local (back-home) research community. Reciprocity is fundamental to the ongoing relationships with Universities and Congressional members.
- Timing influences any organization’s advocacy efforts. Issues gather momentum over time, and advocacy is most successful when it is able to spearhead this momentum and tip the scales in favor of a particular course of action. For example the success of the formal freight research program might have been due to the timing of the initiative relative to the growing national interest in the efficiency of freight operations. The changing nature of the U.S. economy—particularly, increased overseas manufacturing and "just in time" delivery supply chain operations—was a top-of-mind issue for many on the Hill. The Freight Stakeholders Network was able to link the value of an established research program to maintaining infrastructure needs to support the efficient movement of goods by truck, train, ship, or plane.
- The audience for the advocacy communications will change over the term of the legislation—it may begin as grassroots organizations or state DOTs but later in the process it evolves into staff and Congress members. The messaging strategies need to consider the audience— whoever and wherever it is.

- Positioning an issue or reframing it in an inspiring way will increase the chances that it will be heard. “New engineers” are needed who understand the technical complexities of transportation research and can connect the dots to emotive issues—quality of life, national security, economic development.
- Staffers’ time is extremely limited. The case for research needs to be presented clearly and simply (i.e., cost, scope, schedule, benefits, and a clearly stated request). Documents need to be short, succinct, compelling (e.g., use of success stories), and include graphics.
- There is no substitute for face-to-face meetings with Congress. Research advocates need to be willing to “tell a story that is easily understood and intuitively obvious.” Often people who do research are not very good at this as researchers tend to resist “dumbing down” their research. Someone is needed who can translate the research into something very easily understood. More complex ideas can be presented, but only after telling a compelling story to set the framework.
- For information to be effective, it should be provided early in the process, as well as reinforced during discussions and Committee and Conference deliberations.

## **Persons Interviewed**

Ann Brach, Ph.D., Senior Program Officer, Transportation Research Board; Deputy Director of the Strategic Highway Research Program (SHRP II), National Academy of Sciences

William Buechner, Vice President Economics and Research, American Road and Transportation Builders Association

Rod Diridon, Executive Director, Mineta Transportation Institute, San Jose State University

Richard J. Dolesh, Director of Public Policy, National Recreation and Park Association

Michael Griffith, Director, Office of Research and Analysis, U.S. Department of Transportation, Federal Motor Carrier Safety Administration

Barbara Harsha, Executive Director, Governors Highway Safety Association

Graham Hill, former Staff Director and Senior Counsel to the United States House of Representatives' Transportation and Infrastructure Subcommittee on Highways, Transit and Pipelines., currently Chief Executive Officer, ICE Miller Strategies, Inc.

Patrick Jones, Executive Director, and Neil Gray, Director of Government Affairs, International Bridge, Tunnel and Turnpike Association

Dennis Judycki, Associate Administrator, Research, Development and Technology, Federal Highway Administration (Turner-Fairbank Highway Research Center)

Tony Kane, Director of Engineering and Technical Services, American Association of State Highway Transportation Officials

Joseph Kianianthra, Associate Administrator, Vehicle Safety Research, National Highway Traffic Safety Administration

Jennifer Kunde, Lobbyist, Director of Government Relations, Northwestern University

Bruce Layton, Lobbyist, Special Assistant to the President for Government Relations, Northwestern University

William Millar, Executive Director, American Public Transit Association

Lee Munnich, Senior Fellow and Director, State and Local Policy Program, Humphrey Institute, University of Minnesota; also Subcommittee Chair, Congestion Pricing Outreach

Dan Murray, Vice President, Research, American Transportation Research Institute (ATRI)

Neil Pedersen, Administrator, Maryland Department of Transportation's State Highway Administration

Peter Peysner, Lobbyist, Blank Rome Government Relations

Robert (Bob) Plymale, Director, Nick J. Rahall II Appalachian Transportation Institute, Marshall University

Bill Reichmuth, Chair of American Public Works Association's Transportation Committee and also Director, Planning, Engineering & Environmental Compliance, City of Monterey, CA

Robert Reilly, Retired Director, National Cooperative Highway Research Program

Shelley Row, Intelligent Transportation Systems, U.S. Department of Transportation

David Schulz, founding Executive Director, Northwestern University's Infrastructure Technology Institute

Neil Schuster, President and CEO, Intelligent Transportation Society of America

Jonathan Upchurch, former Congressional staffer, currently, National Park Transportation Scholar, National Park Foundation

## CHAPTER 3: CASE STUDY SELECTION CRITERIA AND RECOMMENDED TRANSPORTATION RESEARCH PROJECTS

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### Introduction

Task 3 in the study work plan required the study team to describe the characteristics of transportation research projects that would be useful for in-depth evaluation and to identify a suitable number of projects for Task 4 case study evaluation. We conducted seven in-depth case studies, and each individual case study consisted of a “whole” study, in which facts were gathered from various sources about the entire lifecycle of the transportation research project—from research proposal to funding (where possible) through implementation—and conclusions were drawn on those facts and are presented here.

In analyzing the case studies, our tasks were to:

- Map the communication flow and content from initiation through implementation,
- Determine the communication practices that were used,
- Elicit the participants’ understanding of their roles as communicators and advocates of the project,
- Determine patterns of responses (from audiences) to the communication strategy, and
- Assess effectiveness of communications for securing research (and implementation) support.

Our overall research strategy was to conduct case studies of a wide range of successful transportation research project investment decision-making. Our primary objectives were to highlight lessons learned about effective communication practices from each case study and across all case studies. Each case study covered the following information:

- **Context:** Background information about the research project/program; political, institutional or other situational factors of interest; history of conditions influencing the situation; and current concerns for issues, as well as descriptions of the key actors and the key audiences for communications.
- **Facts about the Case:** Detail on “the value of the research”; narrative that describes the goals and objectives of communication approaches or messaging strategies; map of the communication flow (message senders/receivers, key messages and actors involved); patterns of response from audiences; whether or not participants understood their roles as advocates for the project/program and as communicators of the value of the research.
- **Challenges Encountered:** Perspectives of the various actors relating to the challenges that emerged and how (if) these were overcome; actions taken; and any changes made to strategy.
- **Outcomes:** Analysis of post-communication situation—assessment of the effectiveness of communications for securing research (and implementation) support; the outcomes they expected versus the outcomes that resulted; what lessons for communicating the value of research can be learned from the case; which (if any) attributes of effective communications identified played a significant role.

This information will provide the best insight into how to replicate the success in other circumstances.

## Hypothesis Testing

A primary benefit of the case study approach is that it is useful for both generating and testing hypotheses. From our analysis of the communications efforts leading to the passage of the research components of SAFETEA-LU (Working Paper #1), we identified several strategies and themes that appeared to be associated with effective communications. The case study evaluations will enable us to test the generalizability of these findings to successful cases of investment in transportation research projects, to identify additional effective strategies and tactics, and to expand on the techniques used.

The common threads, or attributes, of effective communication practices that were identified in Chapter 2 were the following:

- Communicating the national value or grand vision of the research
- Building broad coalitions
- Defining a “strategic space” for flexibility of action
- Building long-term, multidimensional relationships
- Working from within
- Using multiple messaging strategies:
  - Providing research-based information
  - Identifying “sticky” messages, e.g., demonstrating benefits in terms of resolving problems, saving lives, increasing efficiency, etc.
- Establishing a basis for exchange or reciprocity
- Tailoring the “ask” to the current mood and concerns of the audience and/or constituent interests
- Using illustrative success stories
- Presenting information in straight-forward, easy-to-understand language
- Hiring, training, and/or selecting professional communicators or lobbyists.

The testing of the generalizability of these attributes can be enhanced by strategic selection of cases.

## Strategy for the Selection of Cases

There are various known strategies for the selection of cases that are best organized into two approaches: *random selection* and *information-oriented selection*. In random selection, cases are randomly selected from a large sample mainly for establishing credibility (i.e., avoiding subjective bias). In information-oriented selection, cases are selected to demonstrate a characteristic or attribute of interest. In our work, we will use the *information-oriented selection* approach, because random selection of a small number of cases from a very large universe of potential transportation research projects might result in cases that are not applicable to the project objectives.

Given the small number of case studies conducted in this project and the information-oriented selection approach, we applied the following specific criteria:

1. A mixture of both “hard science” and “soft science” research.
2. A variety of types of performing organizations (e.g., universities, state DOTs, private sector) responsible for the research (from research proposal to funding to implementation). These organizations also act as the communicators or “senders of communications.”

3. Diversity in the locations of the performing organizations.
4. Different types of audiences for communications about the value of the research.<sup>7</sup>

We identified nine transportation research projects that passed panel review that we felt will inform the research objectives. We researched the first seven of these as case studies. The final two were held in reserve in case one or two of the first seven turned out to be uninteresting or infeasible after preliminary screening.

The selected research projects were identified from a number of sources: TRB's Research in Progress (RIP) database, TRB's *Research Pays Off* series, research projects identified by interviewees for the first two tasks, and research projects put forth by members of the panel or the study team. In selecting the nine transportation research projects or programs from this universe, we defined "research" as a product that could be used more than once by other persons for other applications, to distinguish it from a planning study, for instance. We also systematically excluded research that we felt might have resulted because of a response to a Request for Proposal. We wanted to focus on research that needed to be "sold" to a sponsoring or funding agency or to another audience for implementation. In addition to these two factors, the nine projects were selected to meet the four specific criteria identified above.

## Selected Cases

### A. Hard Science

1. **Adaptive Control Software (ACS) Lite:** A significant portion of traffic delays in metropolitan areas is caused by poor traffic signal timing. ACS Lite, a reduced-scale version of the Federal Highway Administration's (FHWA) Adaptive Control Software (ACS), offers small and medium-size communities a low-cost traffic control system that operates in real time, adjusting signal timing to accommodate changing traffic patterns and ease traffic congestion. ACS Lite can be used with new signals or to retrofit existing traffic signals. (NANCY)

**Performing Organization:** Turner-Fairbank Highway Research Center (FHWA), Siemens, Purdue University, and the University of Arizona

**Location:** National

**Key Audiences for Communicating the Value of the Research:**

- Implementers in industry (to get them to be the deliverers)
- Various state DOT and local operations professionals (by industry)

**Rationale:** This was a market-ready innovation and was integrated by vendors (manufacturers) so that it was part of the signal timing packages. Delivery was through industry. This case study provided insight into how support for the research to develop the technology was obtained, and how the industry was "sold" on the value of the research product so that it is now the "promoter" of the innovation to small- and medium-size communities. It answered the question: how is industry communicating the value of this research product to these communities?

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<sup>7</sup> The audiences noted in the case study capsules represent our assumptions at this point. We may find that these will change after we find out more during the execution of the case study research.



- 2. Development of a Tough Alloy Structural Steel:** Using a high performance steel developed by Northwestern University on behalf of FHWA and US Navy, researchers modified its composition to increase its cold weather toughness and weldability to make it more suitable for highway bridge applications. This new alloy represents a major development in hot-rolled high performance steels that do not require quenching and tempering or other thermo-mechanical processing. The cost per ton is directly competitive with conventional weathering steel (ASTM A588). Northwestern collaborated with the Illinois Department of Transportation to have structural beams fabricated from this special steel, which were then used as main support members on a replacement railroad overpass. Constructability was good, no painting was required, and the bridge continues to perform well under periodic monitoring.

**Performing Organization:** Northwestern University

**Location:** Midwest

**Key Audiences for Communicating the Value of the Research:**

- Illinois DOT Executives and engineers

**Rationale:** The case had to be made to IDOT to actually use this steel in a bridge. The case study examined how the university researchers found out that the department had a problem and what they did to convince the department that they had developed a solution to that problem. So Northwestern had to “sell” them on the value of the prior research. They did, and it has worked well. This steel was developed under UTC funding. IDOT’s installation provided needed matching.

- 3. Seismic Safety Retrofit Program (California Bridges):** Caltrans, as a result of the 1989 Loma Prieta earthquake, initiated a major research program to improve the seismic safety of bridges in the state. The program focused on developing retrofit strategies to improve the performance of existing bridges, as well as improve the current design guidelines for new structures. This program continues today, albeit at a slightly reduced scale. The program involved a significant research component to identify the causes of earthquake damage and then to deploy possible solutions to those factors to the actual bridges. The research program was initiated in the early 1990s and focused on understanding the hazard (i.e., earthquake), as well as the structural response to the hazard. A ground motion research program (one research component) was a combined effort of Caltrans, a utility company and the state Energy Commission. This effort required the Legislature to enact a budget change to allow Caltrans to participate. The bridge structure solution set was designed to take that information and design specific fixes to the problems.

**Performing Organization:** Caltrans and consortium of utility companies .

**Location:** West Coast

**Key Audiences for Communicating the Value of the Research:**

- State Legislature
- Public
- DOT engineers.
- Public utility companies

**Rationale:** The cost of the research projects was large; an average of \$5 million per year since 1989—the ground motion testing program was an additional \$14 million. An aspect of

this case study was to ascertain how the sponsors were able to sell “research” instead of just doing something more immediate. To implement the research, the state needed to defer other capital improvements. This situation required tough decisions among the executives within Caltrans. It turns out that the benefits from the research effort have been enormous; the understanding of the directionality of forces in an earthquake saved between \$70 million and \$100 million in construction costs on the new San Francisco-Oakland Bay Bridge. The 1994 Northridge Earthquake demonstrated that newly retrofitted structures could survive the design event. In addition to communicating the benefits of such a high cost research project, the significant commitment to seismic retrofit also required that the capital construction program be significantly curtailed (approximately one-half of the expected road building program in the early and mid-1990s was postponed). This represented two significant efforts—voter approval for bonds to do the construction program and working with local governments that received fewer new road projects in a state with congestion problems.

4. **Fiber-Reinforced Polymer Bridge Deck:** Virginia Department of Transportation (VDOT) tested the utility of using a fiber-reinforced polymer (FRP) composite cellular deck system to rehabilitate cast-iron thru-truss structures. Testing of the technology was done using a full-scale, two-bay section of the bridge that was constructed and tested in the Structures Laboratory at Virginia Tech. Test results showed that no cracks initiated in the joints under the service load, and no significant change in stiffness or strength of the joint occurred after 3 million cycles of fatigue loading. The proposed adhesive bonding technique was installed on the historic Hawthorne Street Bridge in Covington, Virginia, in 2006. Corrosion and other infrastructure damage had rendered the bridge unsafe for vehicle and pedestrian traffic, and it was closed to traffic. The bridge reopened after installation of the new FRP bridge deck that tripled its load limit because of the significantly reduced deck weight.

**Performing Organization:** Virginia DOT and Virginia Tech

**Location:** East Coast

**Key Audiences for Communicating the Value of the Research:**

- FHWA’s Innovative Bridge Research Construction (IBRC) Program (now the Innovative Bridge Research and Deployment [IBRD] program under SAFETEA-LU)
- DOT engineers
- Public (note: because a significant historic bridge was restored, the research and the opening received significant play in the news media, which demonstrated how new technologies can help save historic structures)

**Rationale:** This research demonstrated the application of innovative technologies in the repair, replacement, rehabilitation, or new construction of bridges or other highway structures. VDOT needed to sell the value of its bridge research program to FHWA to receive the funding under the IBRC program, and then after implementation, it needed to market the value of such research to engineers within the department for implementation of the results.

- 5. Eliminating Cross-Median Fatalities: Statewide Installation of Median Cable Barrier in Missouri:** According to Missouri data, a motorist crossing the median is highly likely to collide with another vehicle, and the chances are high that the opposing vehicle will be a large truck. To address this issue the Missouri Department of Transportation (DOT) researched several options and decided to install a median cable barrier system on I-70 and on other Missouri Interstates. When the cable is struck, the posts yield and the cable deflects up to 12 feet, effectively catching and decelerating the vehicle and keeping it in the median. The installation of 179 miles of median cable barrier on the freeway has nearly eliminated cross-median roadway deaths. In 2006, only two cross-median fatalities occurred on Interstate 70, a staggering 92 percent decrease.

**Performing Organization:** Missouri DOT

**Location:** Midwest

**Key Audiences for Communicating the Value of the Research:**

- MoDOT executives
- State DOT Engineers (MoDOT and other states)
- Public
- Media

**Rationale:** This was a cost-effective safety improvement. This case study provided insight into how support for the research to analyze crash location data, search for solutions, prepare and disseminate the information within the agency/division, and get the go-ahead to start implementation was achieved. It was interesting to find out how the researchers were able to sell the idea within the Department to get funding for the study, what the role of research at the national level or in other states was, and how they communicated the value of the research to the public and media. In addition, FHWA promoted cable median barriers to other states—how are these being “sold” to other states and what is the reaction of the states to the sales program?

## B. Soft Science

- 6. Road User Fee Pilot Program:** With the steady erosion of revenue from the state's gas tax, the Oregon State Legislature created the Road User Fee Task Force (RUFTF) to examine various alternatives for replacing Oregon's gas tax as the primary source of revenues for repairing, maintaining, and building Oregon's roads. RUFTF, administered by Oregon DOT, identified mileage-based charging as a potential solution. Oregon DOT launched a mileage fee pilot project in the Portland area to test several key aspects of charging a per mile fee at the pump in lieu of paying the state gas tax. Based on the results of the pilot program, Oregon DOT will draft model legislation for the Oregon State Legislature to consider.

**Performing Organization:** Oregon DOT and Oregon State University

**Location:** Northwest

**Key Audiences for Communicating the Value of the Research:**

- State Legislators
- Public
- Media

**Rationale:** This was a high-risk transportation research project that needed to be approved for research funding by the legislature. This case study provided insight into how a state DOT can communicate effectively with its legislature and then sell a research idea to the general public. How was the state legislature "sold" on the value of the idea and the pilot program? Implementation of research results needed to be "sold" to the legislature and the general public. This project had high policy and public acceptance risk, although there was some technology risk as well.

- 7. National Cooperative Freight Research Program:** A National Cooperative Freight Research Program (NCFRP) was authorized in SAFETEA-LU. The NCFRP is managed by the National Academies, acting through the Transportation Research Board (TRB). The NCFRP Oversight Committee, the governing board for the program, met on December 14–15, 2006 and selected 10 projects for the Fiscal Year 2006 and 2007 programs.

**Performing Organization:** Broad coalition of public-private interests

**Location:** National

**Key Audiences for Communicating the Value of the Research:**

- Congress
- National stakeholder groups
- Various state DOTs
- Private sector

**Rationale:** Selling programs is harder than selling projects. The National Cooperative Freight Research Program was a successful result of a concerted communications effort involving public and private entities to communicate the "value" of a dedicated and formal freight research program.

## C. Possible Projects

- 8. Development of a Cold Region Rural Transportation Research Test Bed in Lewistown, Montana** <http://www.coe.montana.edu/wti/wti/display.php?id=267>: The objective of this project was to improve transportation maintenance, operations and safety with cold-regions research through the collaboration of academia, industry and government. Northern tier states as well as many countries must address similar issues regarding the impacts of harsh winter conditions on operation and maintenance activities, and how these activities affect the environment, roadway infrastructure, and travelers' safety. Oftentimes it becomes necessary to research innovative designs, maintenance practices and technology applications to address these challenges. However, conducting this type of research can create a public nuisance or safety hazard. Furthermore, and perhaps most importantly, transportation research can oftentimes be one-dimensional. Researchers worldwide recognize and appreciate the multidimensional aspects of this type of research, yet do not have the opportunity to simultaneously study them in a controlled environment. The Western Transportation Institute developed, along with a consortium of five western U.S. state DOTs, a research test bed to study rural transportation issues related to design, maintenance and operations in a colder climate using the runways, taxiways, and other underutilized assets at the Lewistown airport. Establishing a single research facility that has the capability to conduct a broad array of transportation research will save much needed resources over many years.

**Performing Organization:** Western Transportation Institute, Montana State University, Bozeman

**Location:** Mountain Region

**Key Audiences for Communicating the Value of the Research:**

- State DOTs in Montana, Idaho, Washington, Oregon and California (especially the Maintenance Offices)
- U.S. Congress

**Rationale:** This was programmatic—a long-term effort to conduct both basic and applied research. The communication approaches and messaging strategies to “sell” the value of the state-of-the-art research facility on a difficult topic were interesting; the project benefits were communicated differently to the maintenance offices (where technical benefits were important) and the Congressional office (where local job creation at an underutilized airport was important).

- 9. Seattle Area Freeway and HOV Lane Performance Monitoring:** The Washington State Department of Transportation sponsors an analysis of the operation of the freeway and high-occupancy vehicle facilities in the Seattle region conducted by the University of Washington Transportation Research Center. The project uses the same data used to produce the real-time travel time and speed Website maps and has also benefited from funding by the Transportation Northwest (TransNow) Regional University Transportation Center. The case study will focus on the research communication techniques and the connections between data and the messages used in conjunction with legislative and public audiences.

**Performing Organization:** University of Washington Transportation Research Center, Seattle

**Location:** Northwest

**Key Audiences for Communicating the Value of the Research:**

- State Legislators
- Public

**Rationale:** This long-running research project has been a leader in the development and use of archived travel time, speed, and volume data. The research products included a variety of reports and technical memoranda that are used to evaluate transportation improvements by researchers, DOT staff, and legislative staff. The project has also pioneered the development of a number of communication methods, particularly graphic elements, which have provided WSDOT and many other agencies across the country with ways to use data in discussions about the effect of various transportation elements with the state legislature and the public.

## CHAPTER 4: IN-DEPTH CASE STUDY ANALYSIS

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### Introduction

This chapter describes in detail the seven case studies that were selected in Task 3. Each case study represents a “whole” study, in which facts were gathered from various sources during the entire lifecycle of the transportation research project. Of the seven priority cases, five represent hard science projects and two represent soft science projects. We found this reasonable, given the assumption that it might prove more difficult, and therefore more interesting, to communicate the value of hard science transportation research. Performing organizations include FHWA, state DOTs, universities, the private sector, and a broad consortium. This diversity provided a variety of communications approaches and messaging strategies to inform this study. The geographic spread of the selected projects included two national projects; two projects in the midwest; and one each in the east and west coasts and in the northwest. Finally, the audiences ranged from the U.S. congress and state legislatures, FHWA and various levels within state DOTs (executives, engineers and other staff), to the private sector, general public and the media.

Our primary objective was to emphasize the lessons that were learned about effective communication practices from each case study and across all case studies. For each case study, we examined the context of the problem, the facts about the case, any challenges that were encountered during the research project—from proposal to implementation—and the outcomes. To analyze these factors, we mapped the communication flow and content, determined the communication practices that were used, deduced the participants’ understanding of their roles as communicators and advocates, determined the patterns of response to the communication strategy, and assessed the effectiveness of the communication plan for securing support for research. This information will provide the best insight into how to replicate the success in other circumstances.

Our overall research strategy in conducting these case studies was to identify successful transportation research project investment decision making to examine the communication practices leading to funding and implementation. The research team considered the goals and objectives of the different transportation research projects and the extent to which they made goals formulation an important part of their communication strategy framework. An investigation of the ways in which they devised their communications strategies and the methods each used for evaluations of those strategies followed.

Data were derived from multiple sources, including interviews and documents. Interviews were held with senior technical and management staff from the different transportation research programs or projects identified. Because we followed the paths of decision making and/or communication strategies in these case studies, it was necessary to interview multiple players for each case study. The interviews were pre-planned and conducted with a structured interview guide; but as with the list of interviewees, flexibility and fluidity were exercised in conducting the interviews. The request for the interview was done via email with an attached letter of introduction and a list of potential interview topics. The email was followed with a personal phone call to set a time for the interview.

The case studies identified common themes, trends, and factors that influenced success. In analyzing the case studies, the goal was to “debrief success” in-depth to figure out what is working and why, and whether the attributes noted in the first two tasks played a significant role or no role at all. We considered having one case study that would investigate an example of a “failed” transportation research project investment, but were concerned that failed projects might be difficult to identify and investigate.

## Case Study 1: Adaptive Control Software (ACS) Lite

### Issue to Sell:

The value of building public-private partnerships to advance signal software development.

### Overview

The ACS project, especially the development of ACS Lite, shows how a research project can overcome barriers and reach deployment. In the ACS Lite project:

- ◆ Researchers reached out of the box to apply innovative software designed for machine controlled systems through NASA and apply it to signal timing to help alleviate congestion on urban arterials.
- ◆ The public and private sectors joined together and contributed to the success of this research program. To be put into practice, research often needs to be taken up by private industry. The different cultures and constraints of industry and government often make collaboration difficult.

Research is successful when there is a confluence of research that directly speaks to the topic of the day, at a time when funding is available, with a champion who can speak articulately to decision makers and technical researchers, and a team that has a 'problem-solving' mentality that can overcome seemingly permanent barriers to success. The ACS is one such research program.

### Context for Adaptive Control Software

In the mid 1990s, new technologies were booming. One of the innovations that changed the field of computer technology came from NASA research on adaptive control technology. This kind of technology represented a significant forward movement in machine-controlled systems.

Adaptive controlled systems 'taught' themselves by measuring their own performance and adapting to improve based on changing conditions. NASA developed this kind of software to fail-safe flight systems. But the genie was out of the bottle, and many applications for software which analyzed its own performance and dynamically modified itself to operate better in adverse and/or changing conditions were developed.

In parallel, congestion in urban areas was worsening and becoming more of a political issue. The FHWA/Turner-Fairbank Highway Research Center embarked on research to improve traffic signal control. The goal was to take advantage of these significant advances in computer technology and to address the obsolescence of existing control algorithms for urban traffic control systems. The research yielded a program called Adaptive Control Software (ACS).

### Background on Traffic Control Systems

The technology to control traffic systems in most urban areas was getting old. Most closed-loop systems were developed in the late 1980s and were based on an "on-street master" (OSM) controller, which supervised a small number of traffic signals. The OSM had pre-set time of day timing plans (called 'optimized' signal plans) that used traffic counts by direction and time of day to establish flow patterns and set the signal timings. Some of the signal timing plans were based on old count data, or no count data at all. We have all experienced the strange sensation of sitting at a red light while no traffic at all passes in the green direction.



According to Turner-Fairbank research, poor signal timing accounted for 5-30 percent of arterial congestion. Using ACS, traffic-signal timing is updated continually as real time traffic conditions change throughout the day, and in response to special circumstances.

The innovation of the group at Turner-Fairbank was to seize on the promise of a technology that was ‘outside the box’ and develop an RFP to have researchers look at applying it to the problem of static signal timing. The issue of timing is always there, and when ITS had been funded in 1999, the research RFP was ready.

Congestion has continued to be an actionable research topic. Mr. Raj Ghaman, of the FHWA/Turner Fairbank Highway Research Center, first requested funding for a proof of concept task to see if ACS algorithms could be applied to signal timing software.

### Challenges

One of the challenges is that deploying ACS is costly, even though it requires less maintenance than optimized signal timing plans. Depending on the field configuration, installing the controller, communication, and detection components needed to support ACS costs between \$10,000 and \$40,000 per intersection. The cost of maintaining this infrastructure is estimated at \$1,000 per intersection per year. In addition, ACS was designed for large cities, which typically do not utilize closed-loop systems (CLS).

Given these barriers, FHWA identified a need to develop software suitable for use in small and mid-sized cities, where CLS is more common. FHWA researchers developed a new software tool called ACS Lite with the following objectives:

- ◆ Keep the signal settings and timing current.
- ◆ Serve as a cost-effective retrofit for existing National Electrical Manufacturers Association (NEMA)-compliant CLS.

- ◆ Be capable of being retrofitted for an existing system as well as an add-on to new system deployments.
- ◆ Require minimal equipment or communication replacement for deployment.
- ◆ Have backward compatibility with controllers that are of NEMA TS-1 specification.
- ◆ Be limited to NEMA-based CLS for its initial system application.
- ◆ Be targeted to linear or arterial systems for its initial application.

It is important to this project to note that OSM systems, while owned and deployed by local government agencies, are manufactured by competing private companies. FHWA designed the original hardware architecture so that ACS Lite would reside in a general purpose, field-hardened central processing unit and connect to a serial port on the OSM. However, this scheme would not work for all manufacturers due to the complexity of the modifications to the OSM software. One of the major challenges to developing ACS Lite was the proprietary nature of each manufacturer’s modifications to the OSM software.

### Overcoming Barriers to Success

One of the major lessons in the ACS Lite case study is the problem solving nature of the approach by the research team.

At this point in the story, ACS Lite might have been stillborn, and only large urban areas would be implementing adaptive signals.

Industry is protective of their secrets, and adverse to the risk of sharing the details of their systems with FHWA and risk losing them to a competitor.

To encourage private industry participation, the FHWA research team offered a carrot to the

“ACS Lite is a wonderful example of working with industry to put a new technology into practice.”

major industry players: they could have the ACS-Lite software free, and FHWA would pay half of the development costs for the ‘bridging’ software (called an application program interface) for each participating manufacturer. This carrot offered a big reward—better product and low development cost—for the risk of participating in the research with fellow competitors.

Working through the industry group (NEMA), FHWA invited signal and system manufacturers to participate in the research. Four companies accepted the invitation:

- 1) Econolite Control Products Inc.
- 2) Eagle Traffic Control Systems
- 3) Peek Traffic Corp.
- 4) McCain Traffic Supply Inc.

An application program interface (API) was developed for each vendor’s application.

The ACS Lite product, when deployed, will help public agencies with small and mid-sized systems manage their congestion, particularly where poor traffic signal timing causes the congestion. Also, small and mid-sized cities will have a new tool that responds to changes in traffic conditions in near real time, as compared with no response under time-of-day operation.

### **Embedded Case Studies: The technical implementation**

#### ***Econolite Application, Gahanna, Ohio, USA***

The first deployment of ACS Lite occurred in 2005 in the city of Gahanna, Ohio, a suburb of Columbus, Ohio. Gahanna has a CLS along Hamilton Road, with Interstate 270 (I-270) to the south and Clark State Road to the north. Hamilton Road serves as a connection between Columbus to the north and I-270 to the south. Although Hamilton Road does not serve as a major route, local traffic managers classify it as a principal arterial.

To prepare the system for the ACS Lite deployment, video detectors were installed in three locations: northbound Hamilton Road, north of the I-270 interchange; southbound Hamilton Road, north of Clark State Road; and westbound Clark State Road, east of Hamilton Road. ACS Lite uses these system detectors for signal-offset selection.

In addition, loop detectors were installed in the center lane of both northbound and southbound Hamilton Road at Granville Road. This is the major and most congested intersection in the system, and ACS Lite used loop detectors to optimize the Hamilton Road and Granville Road signal splits. All modems were upgraded to the 9,600 baud rate because of the constricted bandwidth of the original twisted-pair communication media. The reason for the upgrade is that ACS Lite needs to obtain the signal performance for the previous cycle for each intersection on a per cycle basis.

An API was written for ACS Lite to interface with Econolite’s field equipment. Normally the software is designed to interface with the OSM. In this case, however, the researchers deemed that it would be too costly to modify the OSM software to recognize ACS Lite and process data requests. Therefore, they opted to modify ACS Lite to bypass the OSM and go directly to each intersection over a spare communication circuit.

Researchers collected field data for five weekdays during morning and evening peak periods to assess the system performance before and after the deployment.

#### ***Eagle Application, Houston, Texas, USA***

The second ACS Lite deployment took place in 2006 on State Route 6 in western Houston, Texas. State Route 6 connects to I-10 to the south and extends beyond George Bush Intercontinental Airport to the north. The part of State Route 6 selected for the field test consists of nine signalized intersections beginning with Clay Road and ending at West Little York Road to the north. This subsystem

is part of a larger CLS maintained by the state of Texas. The system was last retimed in the fall of 2004.

The system hardware consists of nine Eagle signal, model EPAC300 608 M52 controllers with an OSM. The communication media consists of a twisted-pair copper wire operating at 1,200 baud. No system detectors are located along State Route 6.

The northbound detector at Clay Road and the southbound detector at West Little York Road were used for selecting the system offset. Each detector associated with the intersections of State Route 6 at Clay Road, Keith Harrow Boulevard and West Little York Road was used to optimize the signal split.

As in the case of the Gahanna field test, researchers developed an API for the Houston test. Because Eagle OSMs routinely collect the data that ACS Lite processes, the researchers did not need to modify the OSM software. Therefore, they used the original hardware

architecture. As noted earlier, the system modems were upgraded to 9,600 baud.

The procedures for collecting the field data were similar to those used in Gahanna. In this case, the performance was even better. However, the greater benefits are attributed to higher traffic volumes over the Gahanna site.

### ***Peek Application, Bradenton, Florida, USA***

FHWA researchers planned an ACS Lite application for State Route 70 in Bradenton, Florida. The system consists of 10 traffic signals in a Peek-manufactured CLS from U.S. 301 east toward and including the signalized intersection of Caruso Road. State Route 70 is a convenient bypass around the city, connecting to I-75 toward the east. System engineering is complete, and the equipment changes have been identified. The field test and data collection took place in May 2006.

## **Bibliography**

Adaptive Control Software, Turner-Fairbank Highway Research Center, Office of Operations R & D, HRTS-04-037 HRDO-03/12-03(500)E, 2003.

Ghaman, Raj "Adaptive Control Software – Lite: Some Early Results," presented at TRB Signal Committee Meeting, July 11, 2006, Woods Hole, Massachusetts.

## **Persons Interviewed**

Raj Ghaman, Federal Highway Administration, telephone interview, August 28, 2007 with e-mail follow-up.

Marci Kenney, Federal Highway Administration, telephone interview, June 18, 2007.

## Case Study 2: Northwestern University New Bridge Steel

### Issue to Sell:

The value of previous research to convince implementers to use new technology.

### Overview and Background

In October of 2006, the Illinois Department of Transportation (IDOT) completed a highway bridge carrying State Route 83 over a Canadian National Railroad line near Lake Villa, Illinois. The bridge was made of about 500 tons of a new steel developed by materials researchers at Northwestern University, partially supported with funds from Northwestern's U.S. Department of Transportation (USDOT) Tier I national center of transportation excellence.<sup>8</sup>

This case study focuses on the implementation of the results of this research through the modification of one bridge and the construction of another. Implementation of research results is normally the ultimate objective of research. In this case, implementation was particularly important, because practical, field demonstration of this new material was a significant step for certifying it as a viable *bridge steel* and for promoting diffusion of this product through a real world example.

Bringing a new steel to market is difficult, because the market for structural steels—bridge steels in particular—is relatively small compared with the gross tonnage for sheet



Ill-83 Bridge, Lake Villa, Illinois

steels and bar products for automobiles and appliances. The domestically- owned steel industry has been shrinking, and it is not to the advantage of domestic producers to encourage the proliferation of small-volume products. Yet there are needs for domestically-produced structural steels, and much research has gone into the development of such steels, supported by the U.S. Navy, the Federal Highway Administration (FHWA), and others. The researchers in this case, Emeritus Professor Morris E. Fine and Research Professor Semyon Vaynman, of the Materials Science and Engineering Department at Northwestern University, are material scientists who have spent part of their careers working on the development of improved steels.

For bridge and other applications, these researchers were looking for a weathering steel—one that developed a natural, stable coating of corrosion products that would protect the steel members without the need for painting. For ease of manufacture they wanted a steel that did not require quench and tempering to develop its strength. Meaning that, after rolling into plate it did not need immediate immersion in water or other liquid coolants (quenching), but developed sufficient strength when it was air cooled. And they sought a steel that was more easily weldable. While most steels can be welded, they generally require preheating before the welding process to avoid creating a brittle, heat-affected zone in the fused parts. Of course the steel needed to have high tensile strength and

<sup>8</sup>[http://midwest.construction.com/features/archive/0709\\_feature2.asp](http://midwest.construction.com/features/archive/0709_feature2.asp), accessed September 15, 2007.

toughness—but too much strength is not desirable because reducing plate size to benefit from higher strength can lead to structures that were too light and flexible.

They achieved the properties of weldability, toughness, and atmospheric corrosion resistance by adjusting the composition of the steel, particularly by lowering carbon content and adding copper and nickel. This new steel developed at Northwestern University came to be known as NUCu (Northwestern University Copper) steel in its experimental form.<sup>9</sup> The research extended over about ten years, and work on steels of similar composition is still in progress. Support for the work that led to NUCu came from numerous sources over the development period, including, direct funding from the FHWA, Northwestern's Federally-funded Infrastructure Technology Institute,<sup>10</sup> IDOT and other state departments of transportation, and several steel companies.

The result is a plate steel with a higher yield strength—70,000 psi<sup>11</sup>—that achieves this strength without quench and tempering. It is readily welded without preheating, and it is a weathering steel that does not require painting. It is tougher than competing steels at low temperatures.

### Requisites for Implementing Research Results

Logically, the incentives for implementation of research results come from the advantages that new technology or method brings:

- ◆ Improvement in performance.
- ◆ Reduction in life cycle costs.

- ◆ Reduction in implementation or application (here fabrication and/or construction) costs.

NUCu steel offers benefits in these categories. It should be less costly to manufacture than competing steels that require quench and temper treatment or proprietary thermomechanical processing. Its life cycle costs are expected to be lower because it does not require painting. Implementation effort—and presumably costs—are lower because it is readily welded without preheating. Its yield strength is sufficient for economical applications in bridges. There are stronger steels available; permitting the use of less materials, but this can lead to lighter and excessively flexible structures.

Implementing results of research—particularly physical research that involved building something—in this case changing the way something is built, requires collaboration and cooperation among numerous actors. This can be a substantial challenge, a potentially complex trail that can be difficult—or impossible—for researchers to identify and follow. It is more common for researchers to produce their products and make them available, often through publications, and let the marketplace determine the implementation, if any.

In the case of NUCu steel or a similar material product, getting it into a field application is critical to large-scale market acceptance, and to generating benefits from the extended research efforts. To accomplish this, it is necessary to show that the application is, first, feasible, and then desirable, and an improvement over previous materials. But feasibility and performance are generally not enough to navigate through the implementation process. A strong advocate who at once is independent but has a stake in the implementation process is a necessary key to success. NUCu and the Northwestern team had that advocate in Christopher Hahin, a senior metallurgical engineer in IDOT's Bureau of Materials and Physical Research. Hahin recognized the need for an improved bridge steel, he understood

<sup>9</sup> M.E. Fine and S. Vaynman, "Development and Commercialization of High Performance Steel," Final Report, grant number DTRS98-G-0016, July 18, 2003.

[http://www.iti.northwestern.edu/publications/fine/Fine\\_Steel\\_Final\\_Report.pdf](http://www.iti.northwestern.edu/publications/fine/Fine_Steel_Final_Report.pdf), accessed September 16, 2007.

<sup>10</sup><http://www.iti.northwestern.edu/about/index.html>, accessed September 15, 2007.

<sup>11</sup> psi = pounds per square inch.

and contributed to the underlying science, and he embraced the advantages that this new steel promised to bring. He was also excited about innovation in materials. He pressed for the development, testing, and implementation of the new steel from inside IDOT, the first customer agency.

### Proof Testing the New Steel

The research team, IDOT, and others tested small heats of the steel at several points in the development process.<sup>12</sup> The IDOT Bureau of Materials and Physical Research conducted some tests in its own laboratories since the agency needed its own, independent assurance that NUCu would perform as promised. While the researchers were fine-tuning their alloy, IDOT worked with contract laboratories to assess the strength, toughness, weldability, and other properties of NUCu. The development was evolutionary and collaborative, aimed at specific performance and properties targets, involving an extended process of design, heat preparation, testing and evaluation.

The initial development of this new steel was accomplished with 100 and 300 lb. laboratory heats made at Inland Steel's research laboratory (now ArcelorMittal Steel USA) and U.S. Steel Company's research laboratory. For commercial evaluation, much larger heats are needed, far beyond the capacity of steel company research laboratories. Thus it was necessary to work with steel manufacturers to produce these heats, and to secure necessary funding. A 70-ton test heat was made by Oregon Steel Mills.

Development support—both money and contributed work effort—came from several sources, again in a stepwise fashion. These sources included:

- ◆ American Iron and Steel Institute, through the Northwestern University Steel Resources Center (NUSRC)
- ◆ The Federal Highway Administration

- ◆ Northwestern University Infrastructure Technology Institute
- ◆ Inland Steel
- ◆ U.S. Steel
- ◆ Illinois Department of Transportation
- ◆ Prof. Morris Fine, who used his own funds to buy some NUCu cast steel slabs from Oregon Steel Mills for additional evaluation

Chris Hahin of IDOT encouraged the use of NUCu steel for the seismic retrofit of the Poplar Street Bridge that carries I-55, I-64 and US route 40 across the Mississippi River at St. Louis. The retrofit involved adding redundant steel members, but there was resistance to relying on a product untested in the field, so NUCu made up only 20 percent of the new steel for this bridge. Production heats that went into bridge components were on the order of 70-100 tons. It was necessary to work with steel manufacturers to produce these heats, and to secure transportation project funds for them. The results on the Poplar Street Bridge, using steel made by Oregon Steel, particularly the ease of welding and high toughness, were satisfactory, paving the way for expanded use.

The feasibility and performance evidence were coming into place from numerous laboratory tests that were consistent and corroborating. The Poplar Street Bridge application, although not a complete bridge structure, provided field confirmation of the laboratory results. A full bridge application was the next logical step in the application process.

### Full Field Implementation

A number of entities had to agree to make a full-scale bridge application of NUCu possible. Principally, a complete bridge application depended on the owner of the facility, in this case IDOT, requesting the use of the new steel. Here the knowledge-based advocacy of Christopher Hahin was a critical factor. Before the construction of the Lake Villa Bridge, Mr. Hahin submitted a ballot to the American Society for Testing & Materials (ASTM) to

<sup>12</sup> "Heat" is a metallurgical term for a batch of molten steel, varying in weight from 15-100 tons.

have NUCu classified as a standard structural steel, and it was subsequently classified as ASTM A 710 Grade B.

Engineers in the district office where the target bridge was located also had a role in the decision, as did engineers in the IDOT Bureau of Bridges headquarters office. All were supportive because the properties of NUCu (now A 710 Grade B) had by then been established to be superior to commonly used steels through laboratory tests and the Poplar Street bridge application.

The consulting design engineers were not an obstacle because the strength characteristics of the new steel were within the range of other high strength steels. While fabricators<sup>13</sup> are generally able to build whatever the buyer wants, the degree of difficulty of fabrication will affect bid prices. Furthermore, the bridge building market is small, and the community of steel bridge builders is smaller still. Thus, there tends to be a close working relationship among bridge professionals. If a fabricator has problems with a material or design, the customer (IDOT) and the designers will know about it and work to avoid resistance. According to IDOT, there are few enough fabricators in the market to make it wise to accommodate their needs in both design and material specification for bridges. Because A 710 Grade B (NUCu) steel is readily welded without preheating the weld zone, the fabricator found it to be quite attractive.

Similarly, if a material presents construction challenges, contractors may resist using it, and/or the costs are likely to increase. A 710 Grade B (NUCu) presented several construction advantages over traditional steels. Its weathering characteristics eliminated the need to paint the bridge and made transport and assembly easier by eliminating the need to protect—and touch up—pre-painted surfaces.

<sup>13</sup> In steel construction, fabrication of the major components (beams, girders, and secondary members) that will go into the structure itself means cutting, fitting, welding and pre-assembly, normally conducted off-site.

This led to a savings not only in construction costs—almost equal to the cost of the steel itself—but also in long term maintenance costs. This made the product particularly appealing to the IDOT Bureau of Bridges and the district office.

The Federal Highway Administration (FHWA) also played a role in this implementation. FHWA had funded some of the Fine-Vaynman steel research in the past, so the research relationship was not new. In the A 710 Grade B (NUCu) development stage, FHWA provided funds to make some of the steel for testing. It also provided partial funding for the IL-83 bridge under the Innovative Bridge Research and Construction Program (IBRC).<sup>14</sup>

### Resistance to Certification and Implementation

Implementation of new technology may meet resistance from those who benefit from current technology: competitors may wish to protect market shares, and other entities may prefer not to change the way they do business. While it does not appear that there were entities that simply wanted to avoid change, the effect of competing suppliers arose in the *bridge steel* certification process for A 710 Grade B steel.

The primary organization establishing voluntary standards for materials is ASTM International, formerly the American Society for Testing and Materials.<sup>15</sup> Standards are set by volunteer committees of experts, which naturally include suppliers, researchers, and users of the materials. In this case it appears that representatives of steel companies that are offering competing products played a role in slowing certification of A 710 Grade B steel under the A709 standard, which specifically designates certain steels as “structural steel for

<sup>14</sup> <http://www.fhwa.dot.gov/bridge/ibrc/>, accessed September 16, 2007.

<sup>15</sup> <http://www.astm.org/cgi-bin/SoftCart.exe/index.shtml?L+mystore+rrgt8912+1190008610>, accessed September 1, 2007.



bridges.”<sup>16</sup> Other steels can be used in bridges, but A709 is the standard ASTM classification, and designers prefer to specify steel from this classification. Currently, NUCu steel is classified as A710 Grade B structural steel,<sup>17</sup> which makes it eligible for use in bridges. It is likely that this resistance will not prevent certification of A 710 Grade B as a bridge steel, but it will only delay this label. Efforts to gain A709 certification continue on several fronts, led by the IDOT metallurgical engineer and the Northwestern researchers.

### Communications Channels to Support Implementation

Several communications channels were used to show the key parties in the implementation of A 710 Grade B (NUCu) its characteristics and values. Among these were the following:

- ◆ Personal communications within professional relationships based on shared activities and interests, including service on professional committees. The community engaged in steel research, certification, and design is small, and the researchers, suppliers, and potential users of A 710 Grade B (NUCu) were in frequent contact, communication, and collaboration. Not all of these contacts were positive—as stated, there is resistance to the certification and use of A 710 Grade B (NUCu) from competitors—but these professional relationships made communication easy, established the credibility of the researchers, and provided opportunities for advocacy.

<sup>16</sup> [http://www.astm.org/cgi-bin/SoftCart.exe/DATABASE.CART/REDLINE\\_P/AGES/A709A709M.htm?E+mystore](http://www.astm.org/cgi-bin/SoftCart.exe/DATABASE.CART/REDLINE_P/AGES/A709A709M.htm?E+mystore), accessed September 16, 2007. Popular stories emphasize the field implementation— that’s real to lay people, including decision makers. And it’s confirmation that others have used this material with success.

<sup>17</sup> [http://www.astm.org/cgi-bin/SoftCart.exe/DATABASE.CART/REDLINE\\_P/AGES/A710A710M.htm?E+mystore](http://www.astm.org/cgi-bin/SoftCart.exe/DATABASE.CART/REDLINE_P/AGES/A710A710M.htm?E+mystore), accessed September 16, 2007.

- ◆ Presentations at technical conferences, where researchers and potential users could interact.
- ◆ Press coverage, which carried the message about A 710 Grade B (NUCu) to a wider audience. These stories originated with the public relations unit at Northwestern, which prepared press releases and more comprehensive stories. These were vetted for accuracy by the researchers themselves.
- ◆ Papers and reports in scholarly, professional, and trade publications that target prospective implementers.

The process that led to this implementation might better be characterized as a collaboration between researchers (Profs. Fine and Vaynman) and customers (Christopher Hahin and others at IDOT). Much of the basic science effort was accomplished by the researchers using funds from a variety of sources and working independently for the bridge application described here. The final development (leading to the implementation on the Lake Villa Bridge) was the result of a collaborative effort linking researchers and customers that included fine tuning the alloy itself, testing, evaluation, certification, preliminary application (Poplar Street Bridge), and a large scale application (Lake Villa Bridge). There were several bases for this joint work, including:

- ◆ Shared professional interest in advancing the state of the art by developing a superior steel product for bridges.
- ◆ Recognition that A 710 Grade B (NUCu) offered superior characteristics for IDOT bridge applications, particularly savings because there is no need to paint this steel, and its weldability.

### Message Content

Communications topics of importance in promoting the implementation of this research included:



- ◆ Feasibility – the fact that this new material could be produced, fabricated and installed in the field.
- ◆ Proof of performance – that the new steel provided both desired and promised improvements in performance. Performance dimensions included strength, toughness over a range of ambient temperatures, weldability, and self-weathering (eliminating the need for painting).

Performance was documented through testing by the developers, additional tests conducted by the owner-adopter (here IDOT), and tests conducted in independent laboratories at the request of IDOT. The experimental use of NUCu to add redundant members on the Poplar Street Bridge was a proof-of-concept test in a relatively safe setting, adding confidence about the feasibility and performance of this material. That several rounds of tests were performed suggests the importance of confirming

performance and of the adopting agency's own test results.

### **Resistance to Change**

Although this implementation of research results was accomplished successfully, it does illustrate some of the obstacles to changing practices in the field, in this case the choice of materials. Adopters needed high confidence to advance the implementation, not a surprise for a structural component with obvious life-safety implications and potentially high visibility. Furthermore, competing interests may have been less than supportive in efforts to utilize A 710 Grade B (NUCu) in the field as well as to certify it as an A709 bridge steel. The active support of a champion for NUCu, its standardization as ASTM A 710 Grade B, and the persistence of the developers were key factors in navigating through the obstacles to implementation.

### **Persons Interviewed**

Morris E. Fine (Professor Emeritus, Materials Science and Engineering Department, Northwestern University, Evanston, IL), personal interview, July 17, 2007.

Christopher Hahin (Metallurgical Engineer, Illinois Department of Transportation, Bureau of Materials & Physical Research, Springfield, IL), telephone interview.

David F. Schulz (Executive Director, Infrastructure Technology Institute, Northwestern University, Evanston, IL), personal interview, May 28, 2007.

Semyon Vaynman (Research Professor, Materials Science and Engineering Department, Northwestern University, Evanston, IL), personal interview, July 17, 2007.

## Case Study 3: California Seismic Bridge Retrofit Program

### Issue to Sell:

The value of diverting funding from transportation programs to support seismic bridge research.

### Overview and Background

The story of Caltrans' seismic retrofit research might be simply described as one minute of research-confirming events (earthquakes) that followed years of investigation, testing and deployment. The event, in turn, prompted more years of additional investigation, testing and deployment on new problem areas that were identified. The research was clearly shown to be beneficial in these events, but the research would not have been funded or supported without several key players and communication strategies.

### Context of Seismic Retrofit Research

The important events of the seismic research program can be categorized as an earthquake, followed by a research effort or a response. The major seismic events and the significant effects that came from each are summarized in a timeline since the early 1970s to orient the reader. The technical details are not particularly important to communicating the value of the research, but the variety of different treatments and their evolution over time is a significant part of the story.

#### 1971 San Fernando Earthquake (6.6)

The first relevant quake in the series is the 1971 quake in the Los Angeles area.

- ◆ Highlighted the need for retrofits to the bridge column-beam linkage; the beams had slipped off the top of the columns.
- ◆ Solutions – Straps, cables and wider column tops were designed to hold the beams in place to make it more difficult for the beams to slip off.

- ◆ The years following the 1971 quake saw relatively low spending on retrofits and research.
- ◆ Comprehensive upgrade of the *Bridge Seismic Design Specifications and Seismic Construction Details*.
- ◆ Adoption of site-specific seismic design philosophy; more complicated designs tailored to local conditions rather than one-design-fits-all.

#### 1986 Whittier Earthquake (6.0)

The Whittier earthquake was a relatively minor event that caused minor damage, but it did suggest a path forward and a set of steps.

- ◆ After the quake, basic research was begun into practical methods of retrofitting bridge columns on the pre-1971 bridges. The program was carried out at University of California – San Diego.
- ◆ Began a statewide *Highway Bridge Seismic Retrofit Program* to systematically reinforce the older bridges. Program was completed in 1989 after approximately 1,260 bridges on the state highway system had been retrofitted at a cost of over \$55 million.

#### 1989 Loma Prieta Earthquake (7.0)

A significant earthquake that had major consequences including the significant failure of the I-880 Cypress Street Viaduct in Oakland (44 fatalities) and one section of the San Francisco-Oakland Bay Bridge. Eight counties were declared a disaster area after the earthquake.

- ◆ The bridges that had been retrofitted with the Caltrans post-1973 design

specifications and confinement details performed well. Pre-1971 column designs were found to be inadequate.

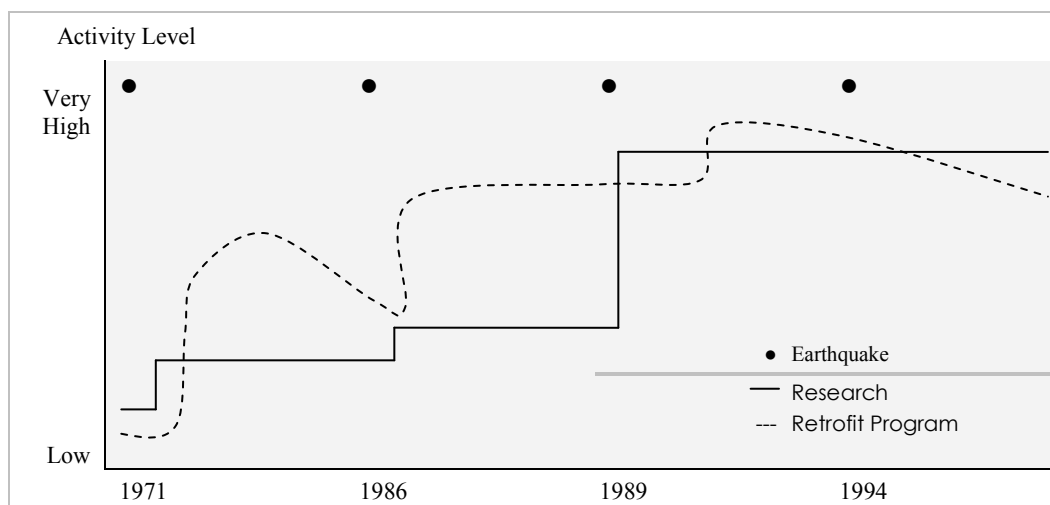
- ◆ Of the more than 4,000 state, county, and city bridges in the area, only 100 were damaged in the earthquake. Only 25 sustained major damage.
- ◆ Of the 800 bridges in the area that used the newer (post-1972) seismic forces and details in their design, only one suffered damage.
- ◆ Following the quake, research focused on three areas:
  - 1) Columns – Structures researchers examined the design of columns and beams.
  - 2) Soil – Ground movement caused a great amount of damage in 1989. The problems caused were significant in themselves, but the uncertainty of how to address them also caused problems for future designs.
  - 3) Soil-structure interaction – The partnership of structures and soil researchers was a key to connecting researcher knowledge to the problems.
- ◆ Seismic retrofit funding was increased to \$300 million annually after 1989. Bridge seismic research funding was increased from \$0.5 million to \$5 million annually with an initial \$8 million from the special State Emergency Earthquake Recovery legislation.
- ◆ The seismic research program evolved from fixing the symptom (the 1971
- ◆ cable restraint was identified as treating the symptom) and beginning to work on

the problem. Treating the symptoms, in essence, transferred the problem to the next weakest link; understanding the problem allowed a complete solution to be developed.

### **1994 Northridge Earthquake (6.7)**

- ◆ The Northridge quake tested the design retrofits developed after the 1989 quake. None of the retrofit structures suffered serious damage (60 bridges in the area of the quake reopened to traffic the following day). Several of the non-retrofit bridges collapsed.
- ◆ Significant failures included the I-10 Santa Monica Freeway on the Wilshire corridor.
- ◆ Success of structures in the earthquake area sold the program but also identified other needs and the need for continued investment.
- ◆ Caltrans seized the moment and learned how to rebuild bridges quickly (in I-10 corridor). This required a combination of several innovative contracting and purchasing procedures, but no compromise in safety or disadvantaged business enterprise goals.

The case study suggests that one main catalyst for much of the research value was earthquakes. Their occurrence sparked interest in research as well as confirming the value of the changes and improvements in design and construction practices developed from the previous earthquake and research. Figure 4-1 is an illustration (not to scale) of the relationship between the events and the effects.



**Figure 4-1: Relationship Between Earthquakes and Responses**

**Note:** Earthquakes represent very high levels of activity for a short time. The retrofit program tailed off before the 1986 Whittier quake, increased after the 1989 quake and declined only slightly through the 1990s. The research program increased dramatically after the 1989 Loma Prieta earthquake.

## Communicating the Value of Seismic Retrofit Research

The seismic retrofit research efforts are split into two major groups: understanding the motion of the ground during a quake and identifying structural needs to resist the earthquake forces. Each of these subject areas has a variety of constituencies, research communities and in some cases, different sponsors and audiences. The research value communication methods and goals are similar, however, and are presented together. The value of the research was communicated on at least two levels; the value of the findings in improving designs and design specifications and by encouraging additional research to solve other problems.

### Rapid Implementation

The value of the findings themselves was demonstrated by the use of the results of experiments even before the reports were written. In several cases there was a technical memorandum written within a week of a test summarizing the test results. These were subject to revision and interpretation in later full project reports, but in many cases the results clearly indicated a better approach to design of a particular element. In these

situations, the new approach was adopted and designs revised to take advantage of the new knowledge.

### Communicating Research Findings to Decision Makers

The new products and designs were used to justify spending and to generate and maintain interest among decision makers. The findings provided support for difficult decisions that were made to re-allocate funds away from new capacity projects and toward retrofit efforts. Using the best projects (those that were readily communicated and understood) as the public face of the seismic retrofit research program allowed funding to flow to the entire research and retrofit project effort and offered the public a glimpse at the solutions being crafted and the progress that was being made.

The role of research champions has long been noted, but the role of researchers as their own best advocate was noted. “Don’t be quiet when something works” was the way one interviewee put it. Failure is a good teacher as well, but too often success is not identified and celebrated. In the first few weeks after the Loma Prieta quake, the presence of well-respected researchers with national credibility not only led to their involvement in designing the

research program and targeting substantial investments in research and testing, but also provided the basis for decision maker actions. This represented a tremendous amount of “immediate leveraging” of expertise that had been accumulated over many years. This ability and credibility must be developed in advance of the event if it is to be useful in selling or expanding the program; it cannot be gained in a week.

## Partnerships

The research sponsors, other researchers and other agencies were all involved in several phases of the research. The “hands-on” relationship between Caltrans and the researchers ensured that the research projects and tests were aimed at creating results that were useful at the design and construction level, as well as allowing the researchers to experiment with a variety of ideas. Involving research peers not only allowed for more rapid review and implementation of results, but the pressure to be prepared for meetings (sometimes held quarterly) moved the research along briskly. Important issues were being investigated, but one interview subject suggested that researchers often “feel more intimidated by the thought of peer review than any level of DOT staff insistence on schedule adherence.”

Combinations of funding sources and expertise were also responsible for creating value from the research. On the front end—obtaining funding—several sources were tapped to address design and construction issues. Caltrans’ Division of Engineering Services (DES) funded a broad range of seismic design studies at an annual expenditure of \$5 million after the 1989 Loma Prieta earthquake (up from \$500,000 before the quake). The Caltrans Division of Research and Innovation was a major partner with the California Energy Commission and the Pacific Gas and Electric Company in a research program carried out at the Pacific Earthquake Engineering Research Center (PEER) at the University of California-Berkeley. This partnership included funding in the amounts of \$4.5 million from Caltrans, \$4.5

million from the Energy Commission and \$2 million from PG&E. The program took two years to obtain Caltrans funding during which the utility funding supported the effort. This combination not only allowed the program to start sooner and solve California’s problems earlier, but also led to much better understanding and design code changes that were transferred to other places in the United States.

On the research end, the goal of this program, known under the acronym PEARL (Program of Earthquake Applied Research for Lifelines), was to understand the ground motion (“the ground moves under everyone”) using the differing expertise of all the agencies. The University of California-Berkeley led the research partnership which was really a virtual research center with research institutions and experts from many locations on the West Coast.

## Flexibility

The way that the research process was organized was also important to the creation of value. Caltrans management saw the value of the research products and, rather than using traditional oversight committees and lengthy proposal processes, some project funds were allocated in streamlined processes that put research supervisors in the role of investment advisors who used information from technical experts to decide where Caltrans would gain the best return on their funding. These decision makers were accountable for program results, but had the flexibility to approve shorter or smaller investigations that resulted in a more nimble and responsive program that took advantage of opportunities as they were discovered. Using multi-disciplinary advisory panels that examined technical results and were responsible for decisions resulted in better deployment and took advantage of the institutional memory.

## **Allocating Funds to Seismic Retrofit and New Capacity Projects**

After the Loma Prieta earthquake in 1989, the Legislature enacted a statute declaring seismic retrofit to be the highest priority use for state highway funds. At the same time, they enacted a temporary 1/4-cent sales tax for seismic retrofit work that raised about \$700 million. The retrofit work was done first with the special sales tax, with backup from regular state highway funding. While capacity projects were not deleted or reprogrammed in order to fund the seismic retrofit, the estimate of funds available for future projects was somewhat reduced.

After the Northridge earthquake, and prior to any legislation, the California Transportation Commission agreed to set aside about \$1.35 billion for seismic retrofit work on state highways. As a result, the 1996 State Transportation Improvement Program (STIP), which would have normally programmed new capacity projects for two added years, in fact deleted about \$500 million in existing projects. Subsequently, the Legislature placed Proposition 192 on the ballot, a bond measure to provide \$2 billion for seismic retrofit, including at least \$650 million for toll bridges (later increased to \$790 million). It was approved by the voters, allowing the regular state highway funds to be rededicated to capacity work.

The major diversion of regular state highway funds to seismic retrofit work was for the toll bridges in the San Francisco Bay Area, particularly the San Francisco-Oakland Bay Bridge. Over the years, the funding plans approved by the Legislature have taken \$4.315 billion in State Highway Account funds for the toll bridge seismic retrofit projects. These were funds that otherwise would have funded capacity projects all over the state. Again, these funds reduced the ability to add new projects to each STIP.

The seismic retrofit program was given a high priority for funding, but that funding had broad

support. In one case, this led to support for new funding (the temporary sales tax). In another, it led to public support for general fund borrowing (Proposition 192). After the Loma Prieta earthquake, the funding came primarily at the expense of the regular Caltrans program. This was particularly notable because it required shifting highway funding from other regions to the Bay Area as part of a larger legislative agreement.

## **Challenges**

As with any highly technical research topic, educating the audience and providing a way for them to be involved in decision-making without requiring extensive briefings is a significant challenge. A combination of the seriousness of the threat, personal commitment on the part of the researchers and administrators, and communication between the research and the decision makers was used to overcome the challenges in this case.

## **Serious Threat**

The potential for fatalities during an earthquake was an undeniable force in communicating value; this same force is not present in other research projects and the use of such threats should obviously not be manufactured by other project communicators. But the success in both sustaining the program and resolving seismic issues points to the importance of selecting evaluation factors that resonate with decision makers and the public. It was clear in reviewing funding and programming decisions that Caltrans leadership understood the seriousness of the threats, but they also felt the public's concerns.

## **Personal Commitment**

Every interviewee referred to the role of the late James E. Roberts (former Bridge Engineer and Chief Deputy Director of Caltrans) as crucial to the speed of response and the sustained research effort over many years. "Jim saved thousands of lives" was not an uncommon summary of his contribution.

Examples included:

- ◆ Conducting meetings between researchers and Caltrans staff immediately after the Loma Prieta quake to outline short-term research efforts to structurally test a remaining portion of the Cypress (I-880) structure. This opportunity to examine the structural response of a bridge to a controlled set of forces was used as an excellent research test, and as a chance to demonstrate the reaction speed of Caltrans to the problems and to provide decision makers with a way to signal their ability to direct resources to solutions.
- ◆ At Roberts' direction, Caltrans began a valuable partnership with utility companies and regulators to study ground motion and its affect on structures. The obvious common interest in ground motion was reinforced by the ability of the private companies and utility regulators to allocate research funds to the efforts faster than Caltrans could. In this situation, the research partnership not only produced products in a shorter time period, it also used the combined expertise of the utility companies who had been investigating ground motion for several years.
- ◆ When Proposition 192 was put to the voters to fund the seismic retrofit program, Roberts appeared in a television commercial (despite the fact that there was some question as to whether it was allowed) to encourage the public to support the program.

### **Communication within the Research Community and to Decision Makers**

Several traditional communication mechanisms were used to encourage researchers to work together—quarterly meetings, open tests, peer reviews of papers, etc.—but there were also innovative approaches that could be used in similar circumstances. In one situation there

were disagreements between model outputs. These arose from the relative paucity of data; one obvious solution was to develop more detailed information and a better understanding of the models. The experts were engaged in an iterative process involving the submittal of model results for a particular scenario. These were compiled and sent out for the group to review without labels attached to the model results. In some cases the differences were significant and related to coding errors or relatively simple “fixes”; in the anonymous environment these could be solved and re-submitted. The next project meeting focused on remaining substantive differences, how the models worked and what additional tests should be conducted to improve the models.

Research decision makers included top management from Caltrans, the Governor's Department of Finance, the Legislative Analysts Office, individual Legislators and various research funding groups. The diversity of these groups was met with an equally diverse set of communication types from briefings, invitations to product or design tests, or technical memoranda on specific topics. As diverse as these groups are, however, their similar goals should be noted. As former Caltrans Director James van Loben Sels put it, “I wanted research to help me do my job.” Legislators were looking for some consistency of opinion or corroborating evidence about the best path just as research directors were attempting to decide in which projects to invest.

Figure 4-2 is a summary of the environment that these very different groups operated within and provides a perspective on the needs for what might be termed “inter-level” communication. Upper level decision makers and their staff may face a dozen issues in a day that they must gain some knowledge and act on, while researchers spend their careers in one discipline. Researchers were most effective when the strength of their research results were combined with communication mechanisms that recognized both the expertise and time constraints of their audience.

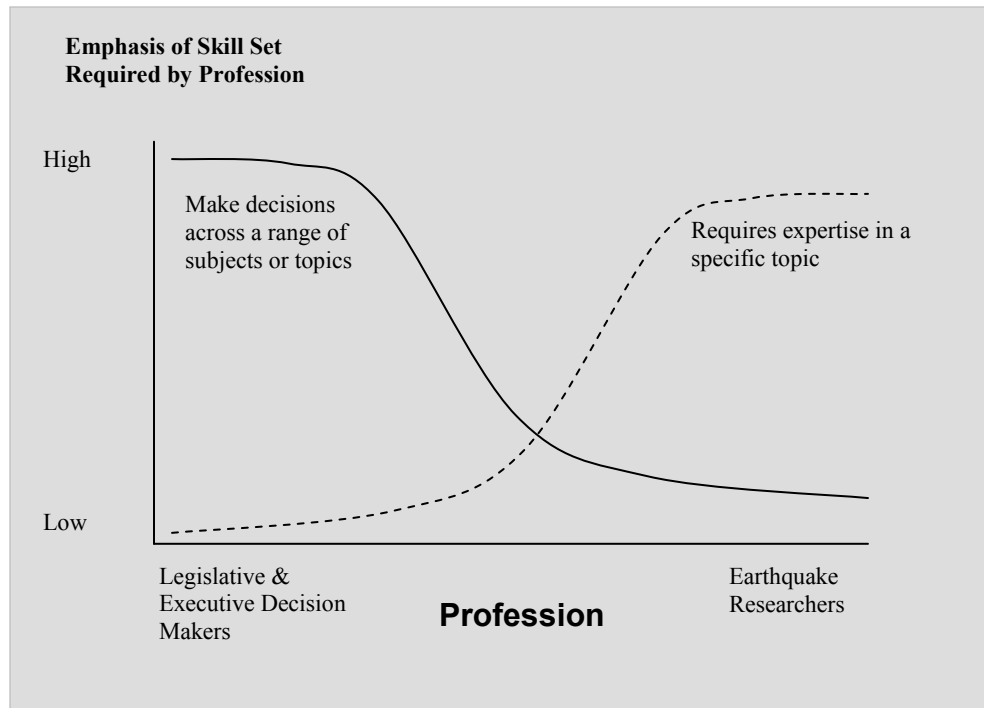


Figure 4-2: Expertise Differences that Define Communication Needs



Figure 4-3 is a good example of this approach. The diagram was an initial depiction of the range of variation in the data related to ground motion forces on structures at different distances from the earthquake epicenter. The diagram is somewhat complicated, but the effect is clear; if more knowledge can reduce the significant variation in expected forces (a factor of 10 difference in the expected ground motion at a location 10 kilometers from the epicenter), designs can be just as safe and much

less costly (in this case, the cost of resisting the force might be less than half of the highest values). Such communication lets the decision makers see the need for research and the pay-off from improved knowledge. It is relatively easy, then, to maintain open communication lines on the progress toward reducing the expected variation, identifying problems with tests, design, schedule or budget.

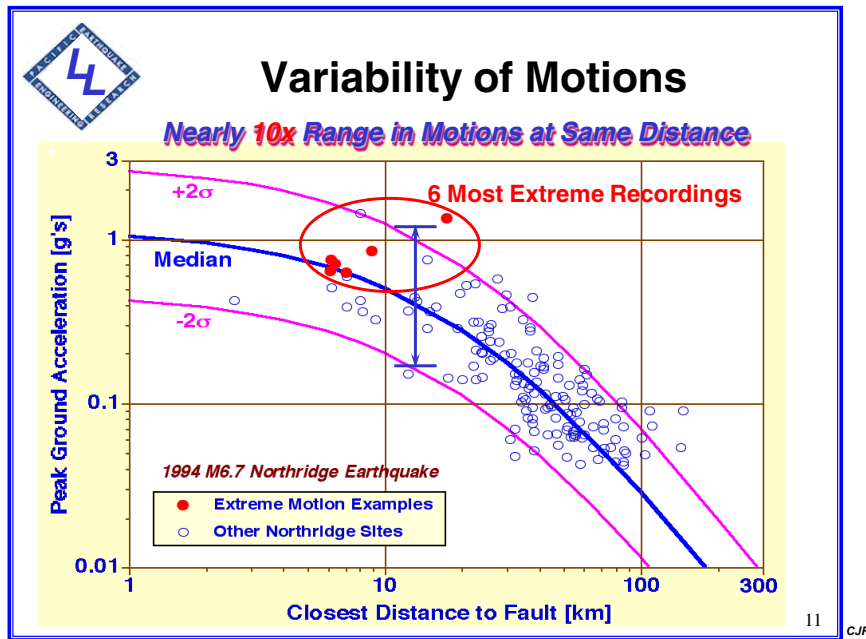


Figure 4-3: Variability of Peak Ground Acceleration for a Given Distance from Earthquake Fault

Source: Thomas Shantz, Senior Research Engineer, Caltrans Division of Research and Innovation

## Outcomes

The seismic retrofit research program has been cyclical but much higher since the early 1990s, with earthquake events providing both the confirmation that past changes were effective and providing impetus and direction to the next round of improvements. Caltrans researchers and designers as well as University researchers have obtained funding from a variety of sources, pursued a number of collaborative research arrangements and assisted in changing resource allocations to address substantial construction needs.

The quake-research cycle has been completed at least three times representing a virtuous cycle that combines momentous events and credible, affordable, well-communicated and understood responses. There is no argument that fortuitous events (from a research support perspective) such as earthquakes form a significant part of the communication mechanism. These precise elements may not be replicable in other research efforts but it is also clear that the combination of a clear problem, credible researchers and proven research products was very compelling. These factors, on some level, are present in most successful research programs.

## Communication Techniques

“Simple and concise” are good guidelines for almost any communication, but when attempting to influence decisions on technical issues by non-technical individuals it is vital. Illustrative examples include the Cypress structure test and other experiments (visual demonstrations); key graphics that create visual relationships between data and decisions; and examples tailored to the audiences.

The media and decision makers were invited to observe tests of structural elements and designs. These effectively communicated the researchers' expertise and the action-oriented Caltrans approach to problem

solving in ways that charts and computer models could not. It also provided decision makers with a forum to discuss the issues and communicate their role and emphasis on resolving problems. Some saw these as trivial photo opportunities, but when viewed from the public's perspective, this serious issue had the attention of very high-level officials who wanted the public to be informed. Certainly there was an element of “salesmanship” involved in these events. The involvement of both seismic researchers and communication experts and the combination of their expertise early in the process helped ensure that the public and leadership remained supportive of the research efforts that were making a difference.

The key graphical element of early decisions to invest in research was an illustration of the “communication payoff.” The earliest version of this graph (Figure 4-3) made a virtue of the uncertainty in the data. The payoff to Caltrans from better understanding was obvious. The physics are important but the example used was persuasive; there was a difference between \$10 million and \$100 million cost in the design modifications to address the problem on the Bay Bridge design. Eliminating the “I don't know how much extra design I need to incorporate” factor was profitable and allowed Caltrans to convince contractors and designers to implement different design elements.

## The Right Stuff

Communication elements of the seismic retrofit research program exhibited many elements of good practice. With a nod to the test pilots at Edwards (CA) Air Force Base, these are presented as “right” elements of a communication plan designed to demonstrate the value of research.

- ◆ Right issue – How relevant is it?
- ◆ Right importance – How serious is it? What is the negative effect of doing nothing?
- ◆ Right time – Capitalize on events. There is a cycle of interest—something is important for a while and then it is overtaken by the next event.

- ◆ Right research – Must be credible and at least some of the products must lead to implementation.  
A combination of “sizzle” or “wow factor” projects and “work” projects is appropriate. The general interest projects can help sell the program, but those typically build on many other less interesting projects.
- ◆ Right message – Research must be pushed toward implementers, decision makers and the general public, otherwise it will not be used. Use “human terms” to communicate value, not just cost-effectiveness.
- ◆ Right recognition of uncertainty – Some scientists want to apply caveats to every conclusion. The fair and simple conclusions from a project or a test are lost in a “fog of uncertainty” and qualifying remarks. The solution is not “spin,” it is explaining the data and what it means. “Make the points and then shut up” is the way one successful communicator/researcher expressed their view on successful presentations.
- ◆ Right format – Anything more than three or four pages is too long for a summary. Details are good, but only after the reader is “sold” on the ideas.
- ◆ Right scale – Use anecdotes and personalize the findings to the extent possible. The value is easier to understand if it is at a scale that is familiar. The anecdote must be connected to the research findings for credibility, but short illustrations are the way many non-technical readers connect with technical findings.
- ◆ Right outcome – If sponsors and other peer researchers are involved all along, there is no need for a sales pitch at the end. The products or results get used because users have seen the data.
- ◆ Right communication methods – Using a combination of targeted approaches to get the messages to the audience created support for research. Whether they were video for the general public, short slide shows with easily understood graphics for decision makers, short summaries of projects for technical and non-technical audiences or rapidly summarized test results, the methods were targeted to communicate findings, implementable solutions and the benefits of action.

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## Persons Interviewed

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- Jim Drago (Chief, Bridge Maintenance Information, Division of Maintenance, California Department of Transportation), personal interview, August 23, 2007.
- Wes Lum, P.E. (Chief, National Liaison, Division of Research and Innovation, California Department of Transportation), personal interview, August 21, 2007.
- Mehdi Morshed (Executive Director, California High-Speed Rail Authority), personal interview, August 21, 2007.
- Clifford J. Roblee, Ph.D, P.E. (Executive Director, NEES Consortium, Inc.), personal interview, August 23, 2007.
- Thomas Shantz, P.E., G.E. (Senior Research Engineer, Caltrans Division of Research and Innovation), personal interview, August 22, 2007.
- Charles Sikorsky, Ph.D, P.E. (Office of Earthquake Engineering, Division of Engineering Services, California Department of Transportation), personal interview, August 21, 2007.
- Loren L. Turner, P.E. (Senior Transportation Engineer, Caltrans, Division of Research & Innovation, GeoResearch Group), personal interview, August 21, 2007.
- James van Loben Sels (Former Director, Caltrans), personal interview, August 22, 2007.

## Case Study 4: Virginia Fiber-Reinforced Polymer Bridge Deck

### Issue to Sell:

The value of polymer bridge technology for funding and deployment.

### Overview

In 2006, the Virginia Department of Transportation (VDOT) employed an innovative material, fiber-reinforced polymer (FRP), and a new adhesive bonding technique to rehabilitate the bridge deck of the historic Hawthorne Street Bridge in Covington, Va., which was closed to traffic in 2002 due to corrosion and other infrastructure damage.

Research on the usability of this new material and technique was led by the Virginia Transportation and Research Council (VTRC), VDOT's research division, and the Virginia Cooperative Center for Bridge Engineering at Virginia Tech. The Research Council was awarded funding on behalf of VDOT through the Federal Highway Administration's (FHWA) Innovative Bridge Research and Construction (IBRC, now the Innovative Bridge Research and Deployment) program.<sup>18</sup>

Over the past six years, thanks to the joint efforts of the Research Council and VDOT, the Commonwealth of Virginia has been awarded more than \$5 million in funding through IBRC, the most of any state. That success can be attributed to identifying a relevant issue for a given project; long-term business partnerships among organizations; collaboration efforts with these partners; favorable reputations; focused planning; the ability to recognize and seize

<sup>18</sup><http://vtrc.virginiadot.org/PubDetails.aspx?PubNo=07-CR14>, accessed September 14, 2007.



Hawthorne Street Bridge, Covington, VA

opportunities; and clear communication of their quality research. Most notably, the success of the research program has provided a more effective transportation system for Virginia, resulting in saved lives, time and money.

### Context

Deterioration of our nation's existing infrastructure system has become a growing concern in the United States. A recent report by the American Society of Civil Engineers (ASCE), released in 2005, highlights how

deficient our nationwide infrastructure system has become by estimating it would take an investment of \$1.6 trillion to get everything—bridges, public schools, dams, railways, roadways—up to satisfactory standards.<sup>19</sup> Rising construction costs and the decreasing value of the gasoline tax have made it difficult for federal and state governments to expand and maintain the infrastructure needed to support our growing population. With recent catastrophes such as the 2007 steam-pipe explosion in New York City and the Interstate 35W bridge collapse in Minneapolis, it's apparent the nation needs innovative solutions to begin rehabilitating our aging infrastructure.

<sup>19</sup> "Public Private Partnerships: Innovative Contracting before the Highway and Transit Subcommittee Transportation and Infrastructure Committee US House of Representatives," American Society of Civil Engineers, April 17, 2007.

Of these aging structures, bridge deck rehabilitation is the most prevalent issue in need of attention. Almost half of the 600,000 bridges nationwide were built before 1940. As a result, nearly 180,000 of these bridges are considered “structurally deficient” or “functionally obsolete,” with the majority of those cases attributed to deteriorating and substandard bridge decks. Using traditional methods of financing and construction, the ASCE estimated it would cost \$9.4 billion a year for 20 years to bring all existing bridges up to standards.<sup>20</sup> Given the deteriorating state of the infrastructure and the financial challenges, there’s a need for a lightweight deck that could be used to repair some of these bridges and bring them to a safe and efficient operating capacity. One program dedicated to this cause has been the FHWA’s IBRC program.

FHWA established the IBRC program in 1998 to provide direction and funding to help state departments of transportation develop and implement innovative technologies and materials in bridge repair. The program’s ultimate goal is to encourage development of these technologies to help produce new, cost-effective and innovative material for highway bridge applications, while also working to promote safety and congestion relief. The advancement of these technologies is paramount. IBRC funds allow state DOTs monetary freedom so they can peruse these advances, in many cases, enlisting the help of universities to conduct the necessary research and testing. Bridges on all public roads are eligible for the funding, with each application processed through the state DOT, in this case, VDOT.

The Virginia Transportation Research Council is a national leader in transportation research, promoting advances in materials, structures, pavements, safety, traffic engineering, and systems operations for various federal programs, including the U.S. Department of

Transportation, FHWA, as well as state agencies within the Commonwealth. VTRC is responsible for all research conducted by VDOT, specializing in developing innovative materials and engineering practices deployed by VDOT, including bridge rehabilitation projects. Established in 1948, VTRC is a partnership between VDOT and the University of Virginia (U.Va.), with an additional and growing partnership with Virginia Tech. Funded primarily by the state along with FHWA grants, the Research Council has an approximate annual budget of \$16.9 million.<sup>21</sup> Its research and recommendations were the backbone of VDOT’s proposal for IBRC funding for the Hawthorne Street Bridge rehabilitation.

## Background

The Hawthorne Street Bridge was a prime candidate for the first deployment of an FRP deck for vehicular traffic in Virginia. Located in the historic district of Covington, the 106-year-old cast-iron thru-truss bridge provides convenient passage over the CSX rail line, which bisects the town. The limited number of bridges across the railway forced vehicle traffic to use underpasses that were prone to flooding, causing problems for emergency vehicles. The bridge’s proximity to a fire station makes it a critical part of the town’s emergency response mobility.

The challenge was to rehabilitate the bridge to provide emergency vehicles access, increase the life expectancy of the bridge from exposure to salt and ice in the winter, while at the same time preserving its historic value (In fact, the bridge was eligible for inclusion on the National Register of Historic Places). Additionally, because of right-of-way issues with intersections on either side of the bridge, VDOT could not build a new structure that would meet current federal standards. The only option was to rehabilitate the bridge. The solution for doing so would be provided by the

<sup>20</sup><http://www.bismarcktribune.com/articles/2007/09/21/news/state/139681.txt>, accessed on September 14, 2007.

<sup>21</sup><http://vtrc.virginiadot.org/DynamicPage.aspx?PageId=4>, accessed on September 14, 2007.

Research Council through years of planning, research and testing.

In 1997, engineers at Virginia Tech and VTRC, in collaboration with FRP manufacturer Strongwell Corporation, began researching and testing the usability of a fiber-reinforced polymer material for highway structures. Traditionally, FRP has been used by the marine and aerospace industries but was thought to have potential in the transportation industry as an alternative to the steel and concrete traditionally used in bridge decking. The majority of this research was conducted by Virginia Tech's Engineering Science and Mechanics/Civil & Environmental Engineering departments at their Structures and Materials Research Laboratory. Within a few years, the research team was ready to test the design's durability and overall performance in a real world environment at the Troutville, Va., weigh station on Interstate 81.

The weigh station was located just north of Blacksburg and the Virginia Tech campus along this major interstate corridor. The team installed two sections of the proposed FRP decking on the off-ramp heading toward the weigh station. Once completed, the team observed more than 1 million cycles of performance from the 13,000 trucks that entered the weigh station daily. After concluding the durability and performance testing, VTRC's attention turned toward drafting a proposal to the FHWA for IBRC funding to help reduce the costs of further experimentation and development. The continued collaboration efforts among the Research Council, VDOT, Virginia Tech, Strongwell Corporation, and FHWA would contribute most to their ultimate success.

### Selection Committees

The process VDOT uses to identify projects to submit to FHWA for this funding is a collaborative effort and an effective first step toward success. The process involves finding a logical balance between structure and technology, or those technologies that can best solve the relevant transportation deficiencies

present throughout the Commonwealth. This process typically begins with the VDOT/FHWA's IBRC Selection Committee and VDOT's Research Advisory Committees identifying and ranking the technologies that have the greatest potential.

The IBRC Selection Committee, made up of members from VTRC, VDOT and state representatives from the FHWA, meets several times a year to discuss various innovative technologies, materials and engineering practices that panel members are interested in submitting for IBRC funding. Each item is evaluated on a few criteria: potential, feasibility, proposed timeline, and costs. Ultimately, the selection committee's goal is to rank these potential technologies, materials and practices, which will assist it in identifying the most favorable proposal candidates. The selection committee also enlists the assistance

“Once again, this is a great example of VDOT’s teamwork and our engineering expertise that is recognized nationally, as well as our collaborative work with Virginia Tech.”

of the VDOT/VTRC Bridge Research Advisory Committee. Comprised of VDOT and VTRC material and structures engineers and administrators, as well as university

professors, this committee meets “twice a year to identify structures related research needs and to disseminate information on research findings that are relevant to bridge design, construction, maintenance, rehabilitation and asset management.”<sup>22</sup> One of its many agenda items is to discuss materials and technologies that should be considered by the IBRC Selection Committee in its evaluations. The valuable and diverse collaborations among organizations produce a thoughtful and actionable list of ranked technologies that is then submitted to VDOT along with a list of candidate structures associated with each. VDOT's willingness to offer up structures based on these recommendations plays a large part in the

<sup>22</sup> Dr. Michael C. Brown, personal communication.



success of the project and illustrates the respect VDOT has for the Research Council's reputation and the trust it holds for VTRC's research and engineering skills.

In this case, the Hawthorne Street Bridge was selected as the perfect rehabilitation candidate for using the newly designed FRP deck. By installing the stronger and more lightweight FRP deck material, engineers would be able to preserve the historic cast-iron thru-truss bridge, but more importantly, reduce the dead-load weight, lowering the total weight of the bridge itself, while nearly tripling its live load capacity from 7 tons to 20 tons, a limit that would allow for use by emergency vehicles.

### Proposal

As soon as a structure and technology have been identified and a plan outlined, VDOT submits its proposal for IBRC funding to FHWA. Through the proposal process, VDOT relies on three aspects: communicating the VTRC research, feedback from the state representative at FHWA, and the valued reputation of their partnerships.

When presenting their research findings, VDOT and VTRC focus on making it clear and concise—not necessarily simple, but in a format where the important aspects of the research are highlighted and brought to the attention of the evaluator. Highlighted sections include lab reports and/or documents summarizing field test results, which give the proposal evaluator confidence in the research, and comfort with their subsequent recommendations. From FHWA's point of view, these are precisely the details needed to make effective IBRC evaluations. Some examples of quality proposals included PowerPoint files outlining step-by-step explanations of the technology, the research and tests conducted, and how the technology will improve the transportation structure. This point relates back to a previous factor—selecting a relevant project. The strength of the proposal relies on the research innovation's ability to rehabilitate the structure and effectiveness of providing legitimate

advancement for the transportation industry. This process starts with the selection committees.

Another advantage, VDOT submits the proposal through the FHWA state representative, a liaison of sorts, who's able to review and offer feedback before formal submission. This relationship helps VDOT and VTRC to write stronger proposals year after year. The liaison assists by shepherding the proposal through the IBRC evaluation process. Long-term professional relationships such as this are invaluable to the success of VDOT and VTRC gaining funding, as they continue to embrace the advantages of collaborations, discussed in more variety in the next section. In the case of the Hawthorne Street Bridge project, VDOT received \$346,239 in 2004 from IBRC to fund research and material for the bridge rehabilitation, \$55,000 of which was used to offset FRP manufacturing costs,<sup>23</sup> with the remainder used by engineers at Virginia Tech to evaluate how the FRP decking would perform on this particular bridge.

### Challenges Encountered, Actions Taken

One of the challenges VDOT faced was organizing a timeline for deployment that would consider the needs of the research team

“These federal grants reflect on the great reputation of the Virginia Transportation Research Council and the cooperative relationship among VDOT's Structure and Bridge Division, FHWA and the Council.”

as well as those of the construction team. The construction engineers were unfamiliar with the research team's process and the time they needed to prepare the material for installation. On the other hand,

the construction team had its own timeline in mind that it's accustomed to working with. As

<sup>23</sup><http://vtrc.virginiadot.org/PubDetails.aspx?PubNo=07-CR14>, assessed September 14, 2007.



a result, both teams needed to be on the same page and organize a timeline that worked for both teams. Additionally, interjecting a new experimental technology into the hands of general contractors and construction engineers who are unfamiliar with the new material can present different challenges.

To overcome this challenge, the research and construction teams held frequent meetings early in the process to determine roles, organize a timeline and answer questions. Opening the doors of communication was a pivotal point of emphasis to assure both parties were on the same page. In these meetings, engineers from VTRC, Virginia Tech and Strongwell Corp. were able to discuss the important details that the general contractors, project designers and construction engineers needed to be aware of.

Another challenge overcome earlier in the process can be represented in two parts—convincing VDOT to commit a bridge and convincing the district engineers and general contractors to use the new FRP material—with each relying on a similar solution, trust in the research. Both VDOT and the engineers were risking their reputations on this new technology being a success. Normally, engineers don't have the option of taking risks; therefore, the Research Council had the responsibility to clearly communicate the level of research and testing conducted on the FRP decking. Engineers need meticulous research results that outline measures taken to certify the new technology. The tests conducted at the Troutville weigh station and at Virginia Tech's laboratories provided just that.

Secondly, the fact that the Research Council is focused solely on transportation research alludes to its dedication, professionalism and commitment to its research. This independent research voice is confidently heard by the FHWA and its IBRC team. The collaboration efforts by VTRC contribute greatly to the positive reputation of the organization. Its favorable relationship with Strongwell Corp., manufacturer of this FRP deck, which was developed during the five- to six-year

partnership reinforces the quality of its work. The business relationships formed between VDOT, VTRC, Strongwell Corp., and ultimately FHWA over the many years of working together helped build favorable opinions of one another.

Finally, VDOT's access to the academic expertise at the University of Virginia and Virginia Tech through their VTRC partnership

“VDOT's corporate tenets recognize RESEARCH as one of its core businesses.”

is an invaluable and rudimentary advantage, which gives them access to multiple academic resources that can be used to solve the multitude of transportation issues

facing the Commonwealth of Virginia.

## External Communications

In addition to the interagency communication outlined in this case study that helped secure the IBRC grand dollars, it's important to note the external communication conducted by VTRC public affairs staff. Its media relations efforts allowed the Research Council to increase public awareness about the research team's accomplishments in preserving the historic Hawthorne Street Bridge and improving the city of Covington's emergency-response capabilities.

VDOT and the Research Council issued news releases and other information about the bridge rehabilitation during the process and upon its completion. Both local news media around Virginia and transportation/industry journals publicized the project. All of this outreach helped to further educate the public on the success of this initiative and its benefits to the community.

Once completed, VDOT and the City of Covington organized a ribbon-cutting ceremony to celebrate the reopening of the bridge. The event drew much attention, including the attendance of the local General Assembly delegate, the mayor, transportation

officials and members of the historic society, as well as the general public.

By increasing awareness of this innovative restoration project, the Research Council brought the project's accomplishments to attention of both the public and the government. When they see the return on a relatively small amount of money invested in innovative transportation research, federal and state legislators are more likely to continue providing the research divisions of transportation departments and others the necessary resources. Communicating the value of these innovations helps reinforce the research conducted by the Virginia Department of Transportation and the Virginia Transportation Research Council, assuring future funding opportunities.

### Outcomes

The fundamentals of "communicating the value of research" involve the following criteria:

- ◆ Identify a relevant issue or problem.
- ◆ Identify favorable technologies, materials or practices that can effectively fix a transportation deficiency.
- ◆ Present clear and concise research tailored to the interests of the evaluating agency.
- ◆ Build business relationships with an emphasis on open communication to build credibility.
- ◆ Create partnerships to bring together state agencies, academic institutions and research engineers.
- ◆ Collaborate with business partners during the proposal process.
- ◆ Gain momentum from successes and highlight your successes through external communication with the public and government officials.

### Persons Interviewed

Michael C. Brown, Ph.D., P.E. (Research Scientist, Virginia Transportation Research Council, Charlottesville, VA), telephone interview, September 19, 2007.

Thomas E. Cousins, Ph.D., P.E. (Professor of Structural Engineering and Materials, Virginia Polytechnic Institute and State University, Blacksburg, VA), telephone interview, September 19, 2007.

Ann M. Overton (Public Affairs Manager, Virginia Transportation Research Council, Charlottesville, VA), telephone interview, August 31, 2007.

Julius Volgyi, P.E. (Assistant State Structure and Bridge Engineer, Virginia Department of Transportation, Richmond, VA), telephone interview, September 21, 2007.

## Case Study 5: Missouri Statewide Installation of Median Cable Barriers

### Issue to Sell:

The value of statewide installation of median cable barriers.

### Overview and Background

Research using the state's database of crash sites and crash types led to the conclusion that cross-median crashes were a major source of fatalities and severe injuries in the state of Missouri. Because these types of crashes usually involve high speeds, head-on crashes and multiple fatalities they are highly visible to the public. There is an underlying sentiment at work as well: often people realize that the driver is a cause or at least partially at fault in many crashes, however, victims in cross-median crashes may be simply driving along the highway. That many of these crashes involve multiple victims in vehicles further highlighted the problem.



Cable median barrier in Missouri.

Photo: Missouri DOT

### History of Cable Barrier Use

In the late 1990s, a Missouri Department of Transportation (MoDOT) engineer in the St. Louis area was tasked with finding solutions to the problem of increased fatal crashes along I-44, whether by crossing the median or not, and implementing these solutions to reduce crashes along a high volume section of I-44 just outside the metro St. Louis area. The first stage in the process was a comprehensive look at the issue and the root causes. The project had a limited budget to use for the purpose so only low cost spot improvements were feasible. The solutions implemented included: shoulder rumble strips, guardrail improvements, and six miles of median guard cable in spot locations with a high frequency of cross-median fatal and non-fatal crashes such as at ramp merges and

tight curves. Another late 1990's cable project was along I-435 in the metro Kansas City area. This roadway was also experiencing a high incidence of cross-median crashes.

In the early 2000's, MoDOT's Central Office staff determined that there were similar cross-median crash concerns on the rural sections of I-70 from Kansas City to St. Louis and on I-44 from St. Louis to Oklahoma. Both highways had 40-foot grass medians, which were approved when the highways were built in the 1950's, but are not sufficient for the traffic volumes or vehicle types now using the

highways. Based on the successful limited experience with median cable barriers on I-44 and I-435, MoDOT determined median cables were the best solution to the statewide issues on I-70 and I-44. In 2003, cable installation began on I-70 from St. Louis to Kansas City and in 2005 work began on I-44. By 2006, the installation of 429 miles of median cable barrier was fully completed.

Median cable barrier posts are designed to break away when struck thus engaging a vehicle with the cables and effectively catching and decelerating vehicles. Cable barriers are more successful at keeping vehicles in the median than rigid systems, such as guardrails and concrete barriers, where vehicles are sometimes redirected into driving lanes after striking the barriers. Depending on the median slope and the amount of preparation work needed, the state estimates installation of median cable barrier costs at \$60,000 to \$100,000 per mile and maintenance costs at \$6,000 to \$10,000 per mile, per year.

Missouri has over 32,000 miles of road maintained at the state DOT level. Approximately 5,000 miles are major roads, which account for 80percent of miles traveled and 45 percent of fatalities. Although MoDOT is divided into ten districts, cross-median fatalities needed to be addressed at a system wide level to best use available safety funds.

This focus on a statewide solution to a specific crash type is something new and noteworthy. The solution needed to be statewide because data demonstrated that after the high-traffic, high-incidence areas had been addressed, other cross-median crashes were occurring at random locations and it is difficult to predict where the location might be. This program is somewhat unique because the focus is on a crash type rather than just crash locations. After the high-incident locations have been addressed, the way to eliminate this crash type is to proceed as MoDOT has done and implement the prevention mechanism, median cable barriers, across the state thus preventing crashes in low as well as high incidence areas.

The philosophy expressed by one team member is “have a need, meet the need and don’t cut corners. Building good projects everywhere instead of perfect projects somewhere, leads to system wide thinking not just chasing after accidents.”

“Have a need, meet the need and don’t cut corners. Building good projects everywhere instead of perfect projects somewhere, leads to system wide thinking not just chasing after accidents.”

In the early 2000’s several factors came together to implement the statewide cable barrier program at MoDOT: a new director turned MoDOT’s focus on system-wide improvements on the highest traveled roadways and not just spot improvements scattered

around the entire MoDOT system; mandatory FHWA safety funding resulting from the lack of an Open Container law in Missouri forced money to be spent on safety projects; and the incorporation of the formerly separate Missouri Division of Highway Safety into MoDOT brought a new focus on safety. With the MoDOT focus changed from all crashes to a new focus on crashes with fatalities and severe injuries, cable barriers seemed to sell themselves because the data was so compelling and it became obvious that median cables were effective and relatively inexpensive. Recent crash data has shown that MoDOT has virtually eliminated a specific type of crash (cross-median crashes) at a relatively low cost.

### Challenges Encountered

In the 1990’s projects, MoDOT was inexperienced with installing cable barrier. They adapted information from New York state, South Dakota and others for low-tension cable installation guidelines.

Slope installation issues were a major part of the early challenges. Low-tension cable barrier is generally known to be most effective when installed on relatively flat, open medians. However MoDOT had to install it in locations with steeper median slopes due to hilly terrain. While this installation was less than ideal, a MoDOT follow-up study concluded that even on steeper slopes than recommended the cable barrier is still effective with a 95 percent capture rate. Over time, these slope issues have been overcome through both research and vendor innovations in high-tension cable systems.

Maintenance issues were greater than expected because there were many more cable hits than anticipated. In some installation areas the cables were being hit and needed repair before installation was even finished. Also in some locations in Missouri, private fiber optic cable is located in the median, which means that the fiber optic owner must identify potential conflict locations prior to replacing cable posts leading to a delay in repair of the cable.

With the significant number of cable repairs routinely required, MoDOT's maintenance personnel had to be convinced that more barrier cable was a good idea even though it would add to the already heavy maintenance workload and strained budget. Open communication with MoDOT's maintenance leadership acknowledged the issues of increased costs to maintain the cable barriers, but also that doing so was worth the effort through reduced fatalities. They sought solutions as a team. A cost analysis of newer proprietary high-tension cable products showed that it will likely pay for itself (higher cost for installation but lower maintenance costs).

Another challenge is that police, fire and EMS vehicles were formerly able to cross open medians at essentially any location in response to dispatch calls. MoDOT focused on communicating with these groups at the outset of the statewide installation project to 1) understand their issues and concerns with reduced access, and 2) convey the benefits to them of fewer highway fatalities with continuous cable runs. As a result MoDOT now designs more emergency crossovers between interchanges for police, fire and EMS vehicles to access the opposite direction and they have ongoing conversations.

Changes made to strategy included changing the type of cable used on future projects from a generic low-tension system to proprietary high-tension systems. The decision was data-based and data-driven by the number of hits, maintenance costs, financial data and cost analysis for life cycle of the systems.

Vehicles entering a median are now captured by the cable barriers where previously some would have stopped in the median or (on rare



**Cable median barrier prevented a truck from crossing a median.**

Photo: Missouri DOT

occasions) some would make it across both the median and the opposing lanes of traffic without a crash. (Cable barriers clearly reduce the number of fatalities on Missouri interstates but may increase the amount of property damage to vehicles that are captured by cable barriers. MoDOT is of the opinion that the trade off of fatal crash reduction for increased property damage is well worth it.

### Communication Strategies

Multiple communication strategies were and needed to be used. For a project of this size (the statewide installation), a number of people have been involved over the years and in a variety of roles at the state DOT.

MoDOT has produced various reports on cable barriers for differing audiences. An early 2000's internal report showed the original I-44 "spot location" installation virtually eliminated cross-median fatalities where the cable was installed. Another report evaluated the effectiveness of low-tension cable installation on slopes. AASHTO did not recommend low-tension cable installation on slopes steeper than 6 to 1, however, some areas of the original I-44 installation had been on steeper slopes and the report showed the cable is performing well. Eventually the issue became a moot point as manufacturers developed high-tension cable products approved for installation on steeper slopes.

The most recent report was a comprehensive analysis of and a direction for MoDOT's Cable Median Barrier Program and focused on what works and what doesn't and answers the question "Where else should we install guard cable, and at what point will the program be completed?" MoDOT engineers will continue to evaluate divided highways, both interstate

and non-interstate, to determine the benefit of adding cable barriers in additional locations.

Communication must occur in a variety of ways. People involved in this project mentioned focusing on their personal communication skills and strategies. One pursued a strategy of personal communication (simply talking with others higher up in the organization) at department meetings and emails to decision makers over the course of years to continue emphasizing his belief in the effectiveness of median cable barriers. If you think something is going well, get the attention of decision makers on it. This person also mentioned that continually repeating the message kept it in mind.

Use early data and resources in the local MoDOT office as well as the Central office to promote the findings of the early research. Installing cable barrier in some small locations early on provided 'test' sites that were frequently referred to for the success they experienced.

One person suggested being pushy almost to the point of being obnoxious. Continually being an advocate for cable barriers over the years. Another said, "Don't be afraid to challenge conventional wisdom. If you have used good logic, stand up for it" and defend your findings.

A personal interest in this topic and belief in the product provides motivation for those involved. One person mentioned driving across the state of Missouri many times and thinking 'it's ridiculous that there isn't more cable' in the rural areas.

When the cities (St. Louis and Kansas City) are able to install cable, people in rural areas are more likely to ask why they don't have it. Thus, this project benefited from the products' visibility to the public.

As one person involved put it, "I don't like writing reports and I'm not good at it. So, I find someone who is." Participants used their

personal strengths and skill areas to move the project forward.

Another key player in the statewide installation has given numerous presentations at ITE conferences, engineering conferences, safety meetings and to other state DOTs around the country on MoDOT's resounding success with installation of cable median barriers.

Focus on crash types and not on specific locations. Fatal crash locations are random, but crash types are not, so the statewide installations were key to eliminating this type of crash.

Fatal crash locations are random, but crash types are not, so the statewide installations were key to eliminating this type of crash.

Presentations need to focus on this aspect of the project.

Strategies for communicating and 'selling' the benefits of guard cable to MoDOT upper management included:

- ◆ Continued support of cable barriers is tied to the research, especially research about how to install it, where and why. The decisions made by MoDOT senior management and leadership are data driven.
- ◆ Senior management may have only five minutes to spend on a topic, so the message must be tailored to the audience.
- ◆ Be clear and basic in words and graphics.
- ◆ Say about half of what you want to say. Most engineers want to carefully describe a project in detail, but when you have a limited amount of time, be sure to carefully limit your comments and presentation to allow plenty of time for senior management to ask questions. This ensures that all the topics that are of interest to them are covered. A 30/70 rule is appropriate: 30 percent for the

presentation, and 70 percent for questions and discussion.

- ◆ Keep in mind that senior management's backgrounds will lead to differences in areas of interest and concerns.
- ◆ Senior managers are interested in 'big pictures,' concepts and funding issues. They may listen to many researchers from the DOT or universities. These engineers are highly interested in their particular topics and think that others are too. They are eager to share all they know.
- ◆ The concept that 'less is more' is key to remember. If using PowerPoint, know how long it takes you to get through each slide. Having less than one slide per minute is a good rule of thumb.
- ◆ Always allow plenty of time for questions because the questions are the topics or items that are really of interest to your audience.
- ◆ When dealing with non-engineers, be sure to use language that everyone can understand. It may help to visualize that you are talking to your grandmother or mother.

The following suggestions were given for making effective presentations:

- ◆ Engineers may have a tendency to think people know more than they actually do; avoiding this assumption will allow the researcher to better connect with the audience.
- ◆ Good speakers are exciting and thought provoking as opposed to nervous, cautious readers of their presentation. A good presenter feels comfortable on stage and with the audience and makes a connection to the audience. Also, it is important to be the expert in your area so that you feel comfortable talking about the subject.
- ◆ Researchers who do become good presenters have a tremendous advantage in promoting the value of their research,

being invited to speak at conferences, disseminating their work and bringing positive publicity.

- ◆ Ask for feedback on your presentations. In the community of researchers, no one will tell you if you gave a poor presentation unless you ask.

### **The Role of the Media**

Press coverage on this project has been very positive. MoDOT has not called Town Hall type meetings about the cable barrier installation because the press and the public are supportive of it – they see the number of cable hits when they drive down the road, so the story tells itself. The message here is so strong and easy to communicate that the implementation is fairly easy to justify. For press releases, relay the crash data in terms that everyone can understand and relate.

### **Analysis of Post-Communication Situation**

The analysis is continual because of the data available. MoDOT generally knows within hours if a cross-median crash occurs. It is rare, but possible for vehicles to get past the cable barrier. Also the barriers were not designed to stop semi-trucks although in practice they have been found to do so. Additionally, communication about the cable barriers has been found to build on itself. The more the topic is communicated the more questions arise from within and from outside of the state. Missouri benefited from North Carolina's work with cable barriers and now shares its research with other states.

A lesson learned about communicating research is to do it liberally. While people in Missouri have been giving presentations on cable barriers for over two years, they are still encountering many people who have never seen the presentation. Writing papers for TRB, giving presentations, attending web conferences and webinars increases attention and awareness of the research. As states like Missouri share their research and implementation data it benefits the entire transportation research community.

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## Persons Interviewed

Brian Chandler (Traffic Safety engineer, Missouri Department of Transportation, Jefferson City), telephone interview, September 13, 2007 with email follow-up.

Tom Evans (District Traffic Engineer, Missouri Department of Transportation, Kansas City), telephone interview, September 13, 2007.

Randall Glaser (Project Manager, Missouri Department of Transportation, St. Louis), telephone interview, September 14, 2007 with email follow-up.

Joseph Jones (Engineering Policy Administrator, Missouri Department of Transportation, Jefferson City), telephone interview, September 21, 2007.



## Case Study 6: Oregon Mileage Fee Concept and Road User Fee Pilot Program

### Issue to Sell:

The value of implementing a mileage fee program as a gas tax replacement.

### Overview and Background

In 2001, the Oregon legislature began its legislative session with an educational hearing on future fuel-efficient vehicles (i.e., hybrids, national gas, biofuel, etc.)

The chairman of the house committee on transportation, Bruce Starr, left that session concerned that the fuel tax might become a declining revenue source for Oregon's road system. He led an effort in the 2001 Legislative Assembly to address the long-term viability of Oregon's road finance through the passage of House Bill 3946, which mandated the formation of a 12 member Road User Fee Task Force ("Task Force"). The Task Force was charged with designing a revenue collection strategy that could effectively replace the fuel tax as a long-term, stable source of funding for maintenance and improvement of Oregon's road system. Appointments to the Task Force were made according to the requirements of statute. Task force membership consists of four legislators, two Oregon Transportation Commissioners, a city mayor, a county judge, a transportation research academic, a private businessperson, a representative of the Highway Users Conference, and a public policy analyst. The Task Force will sunset in 2010.

### Context

The legislation also required that the Oregon Department of Transportation (ODOT) staff the Task Force and develop, design, implement, and evaluate pilot programs to test the fuel tax

alternatives identified by the Task Force. ODOT had no one in-house who could do this. James Whitty was hired in 2001 to run the Task Force. His title currently is: manager, Office of Innovative Partnerships and Alternative Funding. His background was as a lawyer, followed by years in public policy lobbying. From 2001 to 2004, he was the only staff, with outsourced technical assistance as needed. Staff was added in 2004. As administrator for the Task Force, Mr. Whitty's direct report was to the ODOT chief executive; at the same time, he and his staff were ultimately " beholden " to the Task Force, not to ODOT. This enabled

him to work somewhat outside the system or at least not be constrained in communications activities by ODOT channels and concerns.

"Oregon will be well served in finding a solution to this concern before it becomes an emergency."

*Senator Bruce Starr  
Road User Fee Task Force Chair*

The Task Force started out with \$320k in federal funds and \$90k in state funding; about 80 percent of this was Federal Highway Administration, (FHWA) funding and 20 percent was state. They had asked for more but only got \$320k. The Task Force received a subsequent federal grant for \$900k, basically making up what they did not get for the start up. The total \$1.22 million in federal funds, and state match, was not enough to commence and complete the pilot test. After the conceptual phase (summer 2003), they received an additional \$944k grant from FHWA in 2004 to implement the pilot test. With total federal funding of \$2.164 million, along with \$771,000 in state funds, the conceptual development, pilot development and operation of a pilot test were feasible.

## Facts about the Case

The mission of the Task Force was to develop a revenue-collection design funded through user pay methods, acceptable and visible to the public, that ensured a flow of revenue sufficient to annually maintain, preserve, and improve Oregon's state, county, and city highway and road system.

## Conceptual Phase

Representing the Task Force and ODOT, Mr. Whitty spent nearly two years holding meetings, reviewing research (i.e., literature review, presentations and reports), and having discussions with experts. Through these meetings, the Task Force adopted a public outreach process and received comment from a number of stakeholders.

A large part of this outreach was making the case for developing a new funding source for the Oregon road system as an ultimate replacement for the gasoline tax.

After 16 months of research and outreach, the Task Force concluded that the fuel tax was an excellent revenue source, but it had to be replaced. As a replacement, the Task Force recommended a user fee—specifically, a mileage fee that would be based on vehicle miles traveled. The Task Force's vision involved data and fee collection at either fuel service stations or at an independent center. Mileage data would be gathered through an "electronic odometer" such as a global positioning system or odometer tag. The mileage data from the electronic odometer would be uploaded to data readers via radio frequency transmission and forwarded to a computer for fee billing. The rate applied would be approximately 1.22 cents per mile driven, which is roughly equivalent to the current state fuel tax on gasoline for the average passenger vehicle. The electronic odometer device would be required for new vehicles purchased in Oregon or brought into the state.

HB 3946 required ODOT to begin a pilot test of the recommended strategy no later than

2003. However, the pilot test was not begun until 2006. Mr. Whitty's office used 2003-2005 to develop a pilot program that would meet the numerous standards and criteria set by the Task Force in a 2003 Legislative Report, including guarantee of privacy, affordability, technical practicality, system reliability and accountability, and minimum burden on private sector. Thus, a number of technological challenges had to be addressed and decisions made in order to develop a practical test of the Oregon Mileage Fee Concept.

During 2003 and 2004, the Task Force and ODOT collaborated to refine the design features of the mileage fee system. This collaboration entailed an iterative process of research, analysis, policy development, and evaluation. There was input from industry and public sector experts as well as the expression of public sentiments and concerns during an ongoing public involvement effort. ODOT contracted with consultants from Oregon State University and Portland State University to examine alternative policy and technology options supportive of a user-fee system.

An internal working group at ODOT also met weekly throughout 2003-2005 to identify and solve administration issues. Also ODOT needed to ensure user participants (the motoring public) were satisfied with the operational and administrative aspects of the test so that participants would want to continue to participate through the end of the program. A focus group was held. Also ODOT met with representatives of the Oregon Petroleum Association, Western States Petroleum Association, American Civil Liberties Unions, and auto manufacturers to discuss issues related to the pilot program.

## Pilot Test Phase

In spring 2006, ODOT started a pilot test of the mileage-based fee and congestion pricing. The pilot test program consisted of a two-step process that supported potential adoption of a mileage fee for Oregon that contained a time-of-day pricing component. The first step involved small-scale testing of an electronic

odometer for mileage data collection; radio frequency technology for summary mileage data transmission; and related technology to support a mileage fee. The second step involved using the same technology for large-scale testing of the behavioral elements of a time-of-day component to a mileage fee (congestion pricing) as well as the mileage fee.

In 2004, after the completion of an operational test, the Oregon State University researchers recommended the technology be further developed to improve its ease of use. Accordingly, ODOT applied for and was awarded additional FHWA funding under the Value Pricing Pilot Program in order to ensure the technology would function as required when the Pilot Program participants—real drivers, real service station owners, and real service station attendants—used it.

Following conclusion of the pilot test in March 2007, the next step is a refinement of technologies; no private firm has a prototype to sell for either the vehicles or the service stations. ODOT did not anticipate that further technological refinement would be necessary before working with the automobile industry and fuel distribution industry on technological specifications. It has been projected that it will

### Timeline

2001:	Task Force by House Bill 3946
March 2003:	Task Force, administered by ODOT, recommends to the Oregon Legislature and ODOT a mileage-based fee for testing in a pilot program.
May 2004:	ODOT and OSU successfully test on-board equipment that counts and communicates mileage so that gas stations can collect information and deduct the gas tax while adding the mileage-based charge.
Summer 2005:	A pre-pilot using 20 vehicle tests the VMT collection, zone differentiation, and data reading elements of the program.
Fall/Winter 2005:	Recruitment of volunteers for the Pilot and equipping cars with on-board equipment begins in Portland, Oregon.
March 2006-2007:	The Road User Fee Pilot Program commences with approximately 300 vehicles.
Summer/Fall 2007:	Final report and recommendations made to the Oregon Legislature and ODOT.

take 3–5 years of additional technology refinements to get something ready for implementation. There is some interest from the private sector (PPP), but no government funding resources. ODOT estimates that it needs about \$12–15 million as sign of endorsement from government that is viable for a PPP.

Currently, Mr. Whitty is focused on building support for the mileage-based program. He is traveling to different states to market the idea of conducting pilot projects to build momentum for the concept. He believes this will lead to ultimate adoption of a mileage-based user charge program. He is targeting DOTs and legislatures in key large states (Texas, Florida, California, Georgia) and assisting strong inquiries in smaller states (Minnesota, Colorado, Maine), national industry groups (e.g., American Public Works Association, American Association of State Highway Transportation Officials, and National Association of Region Councils) and other groups, such as the Transportation Research Board. This strategy is focused on raising awareness and visibility of the program (i.e., getting it nationally recognized) so that it will have a greater chance of successful implementation in Oregon.

## Challenges Encountered

The Road User Fee Task Force was a small, but high profile program. Mr. Whitty decided early on that it should be managed in a very open manner, with a large amount of public outreach effort, considering the program's size. The program has both supporters and opponents. Opponents' concerns were focused on privacy issues, the potential for rewarding the least fuel-efficient vehicles, and the belief that distance-based fees would be in addition to the fuels tax, not a replacement. Early in the process, opponents were quite vocal. However, ODOT took the position of addressing opponents' concerns in public outreach and education efforts, instead of backing away from them or ignoring them. With time, many opponents have become supporters.

Neither the Task Force nor ODOT had a formal communications strategy. But it had a goal—to move the public to understand the problem of limited transportation funding so that they could accept a solution. Mr. Whitty did not know how to do this himself; and he had no staff. Grants did not come with money to outsource a media strategy (\$50K for public outreach). He could have used media expertise.

His next step is to ensure that the appropriate development steps are taken leading to drafting legislation. Public acceptance is the key to this happening. The Oregon legislature can believe that the concept makes sense—but legislation will not be forthcoming without public acceptance. The public needs to say, “we consent.” Mr. Whitty believes a significant challenge in his case, but also a challenge in general, is that the public does not understand what is going on in terms of transportation finance. “Until we get the public to understand that the system needs saving, we can only do what the public let's us do.” Everyone is dealing with this issue—state Departments of Transportation (DOTs), metropolitan planning organizations (MPOs), and legislators. He believes that the communications need to come from the legislators—not the DOTs. We need a communications plan that legislatures can

employ. Communication on this issue should not come from the DOTs because the DOTs tend not to be trusted by the public, especially in the area of advocacy.

## Communications Strategies

The Road User Fee Pilot Project generated a large amount of national and international interest. Mileage-based fees are new and are still considered experimental and innovative. For this reason, ODOT and the Task Force deliberately chose to reach out to the public, not to generate publicity, but to ensure understanding of “Why Oregon was pursuing this?” This public education was done with an understanding that the motoring public will not respond positively to change quickly and will need time to accept the nature of the problem and become comfortable with viable solutions.

The public outreach activities that were used included:

- ◆ Open meetings of the Task Force.
- ◆ Holding geographically diverse public hearings.
- ◆ Holding a focus group.
- ◆ Openness and providing assistance to the media.
- ◆ Specific outreach to representatives of the retail fueling station industry.
- ◆ Presentations to stakeholder groups.
- ◆ Presentations to transportation professionals.
- ◆ Presentations to state and local government entities.
- ◆ Providing information to other jurisdictions (states, nations, and localities) when requested.

The Task Force accommodated public testimony at each of its meetings. Three public hearings were held around the state. Task Force staff held two stakeholder meetings, in January and June 2002, to inform stakeholders of the process and proceedings and to gather comment on the process and Task Force recommendations. Task Force staff made several presentations to stakeholder groups and

legislative panels. Presentations to the public and other groups started with a simple PowerPoint presentation about the Task Force. Audience questions were noted. Then, the PowerPoint presentation was altered based on the questions for the next time. In this way, the presentations continuously evolved to include what people needed to hear.

The Task Force never had a public document. There were no resources for its production. The first printed document, a primer, was produced in July 2007 for the National Surface Transportation Policy and Revenue Commission. The Task Force and ODOT relied on the Website as the primary vehicle for an exchange of information. It was through this interactive Web site (<http://www.odot.state.or.us/rufff>) that the Task Force received public comments. Mr. Whitty responded to all written and electronic correspondence submitted by the public on the development of the mileage fee concept and associated pilot program.

Media reports were also used to inform the public about the work of the Task Force. The idea was to communicate regularly and often. News articles and editorials appeared in newspapers and newsletters across Oregon and the nation. Mr. Whitty gave numerous radio interviews to stations broadcasting through Oregon and the nation, and a few in the United Kingdom. He was also interviewed for a major network television evening news story broadcast nationally.

### **Conclusions/Lessons Learned**

The Road User Fee Task Force is successfully communicating the value of its mileage fee concept and road user fee program. The elements of success are noted below.

- ◆ Total transparency and total honesty. The Task Force staff placed all process documents and reported decisions on the Website. Nothing was hidden from the public or other stakeholders. (Note: this led to putting everything produced on the Website, except quarterly reports to FHWA and consultant contracts).

- ◆ Total accessibility. Mr. Whitty agreed to interviews requested by every mainstream media reporter and spent as much time with them as they wanted. The Website was interactive and every attempt was made to respond point-by-point to each email (except those which were simply throwing an insult). He took every opportunity to make presentations about the project externally to the general public and business groups and internally to the state government/legislature.
- ◆ Fearless advocacy. “If we like the work we’ve done, then we should be able to generate good explanatory arguments for whoever asks a question.” The Task Force staff never shied away from an opportunity to present their work to those willing to listen, learn and challenge. (Note: Task Force staff decided not to do talk shows on radio or TV because those programs are not about listening and learning.)
- ◆ Perpetual openness. The Task Force staff welcomed critical feedback on their proposed approach and was willing to alter their approach when they learned something valuable. The Task Force staff continually questioned their own assumptions, stances and approaches. However, if others made wrong assumptions about their work, the Task Force staff quickly corrected them, publicly (if possible), if their assertions were made public.
- ◆ Engage opponents. To obtain the goal of public acceptance, the Task Force staff needed to understand opposing arguments and attitudes. This helped to create the best supporting arguments and understand weaknesses in their approach (for which they could adjust the concept if desired). They also found this helpful for understanding why the opponents oppose—what is the basis for their vexation?

- ◆ Teach potential allies. There were natural allies for their approach. The Task Force staff took every opportunity to teach potential allies the fundamentals of their approach and encouraged allies to join them.
- ◆ Continual reassessment. All elements of the program must undergo reassessment, from the key conceptual structures to the message delivered to the general public and media. A project is like guiding a raft down a river. One has the means to go all the way but must be attentive to rocks, eddies and white water and adjusts accordingly if the destination is to be reached.

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Research Spotlight. A Publication of the Texas Senate Research Center, April, 2006.

## Persons Interviewed

James Whitty (Manager, Office of Innovative Partnerships and Alternative Funding, Road User Fee Task Force), telephone interview, September 2007.

## Case Study 7: Legislative Advocacy for Programmatic Research - The National Cooperative Freight Research Program

Issue to Sell:  
The value of a national freight research program.

### Overview and Background

The National Cooperative Freight Research Program (NCFRP) was mandated in the most recent surface transportation authorization act, Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). The program is authorized at \$3.75 million per year through 2009. It is sponsored by the US Department of Transportation's Research and Innovative Technology Administration (RITA) and managed by the National Academies through the Transportation Research Board (TRB). Program governance comes from an Oversight Committee made up of a representative cross section of freight stakeholders.

### The Public Interest in Freight Research

To build Congressional support for a federally-sponsored freight research program, it was first necessary to establish that there was a public interest in freight issues. Historically, freight has been considered to be in the domain of private sector of carriers and shippers, among others. The public interest was further diminished when the industry was deregulated through the Staggers Act (railroads) and the Motor Carrier Act (trucking) of 1980. Deregulation not only diffused public interest in freight industry issues, but it also eliminated some data collection programs, and as a result some resources previously available for freight research were lost. Thus, freight research issues were not approached systematically and comprehensively in national programs; when decisions were made about public funding for transportation research, freight was “not in the clubhouse.”

A variety of factors have changed both the role and consequences of freight transportation in the U.S., and together these have piqued the public interest in freight issues. The rapid globalization of manufacturing and distribution at once increased flows and amplified the demand for rapid, reliable and efficient goods movement. The economic implications of bottlenecks in the distribution system became more evident and more important. Shippers, carriers, and government as well began to see freight movement as an integrated, multi-modal system—the logistics sector. The choice of shipping mode, driven by performance and costs characteristics, had real economic, social, and environmental consequences of importance to the public and its decision makers.

Freight moves substantially on the public road network, and most ports and all of the inland waterways system are publicly owned and operated. As roads became congested and the infrastructure was stressed by many heavy trucks, the public interest in the efficiency and safety of highway freight grew clearer. And a systematic perspective demanded inclusion of the railroads—which in some cases could offload the highway system and thus contribute to solving problems of publicly owned transportation infrastructure. While individual firms and trade associations could advocate for, and engage in, research focused on their businesses, no strong entity had a multi-modal perspective on research, and none took responsibility research at the interfaces between modes, at a time when intermodal movement of freight was becoming the norm for all but bulk commodities.

There were numerous questions on the freight agenda that appeared to warrant research. Importantly, there was and is a belief that

research results often lead to more money for projects, investments that can improve capacity, increase reliability, reduce costs, etc. Research problem statements were generated by TRB freight committees, but these did not produce financial support for research, and there was some belief that these statements were too strongly focused on highway issues. And there was a difference in interests and perspectives between public sector freight advocates and the freight industry itself.

### A Coalition of Freight Interests

The Freight Stakeholders Coalition (FSC) was formed in the early 1990's as the freight community began to recognize the benefits of coordinating its efforts to bring national attention to freight issues and to lobby for funding for freight-related projects in the surface transportation authorization bills—the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) and the Transportation Equity Act for the 21<sup>st</sup> Century (TEA-21, 1998). The FSC brought together trade and professional organizations, comprising a multi-modal community of business and government interests, to advocate for the freight issues.<sup>24</sup>

Current members of the FSC are:

*American Association of Port Authorities*  
*Association of American Railroads*  
*American Association of State Highway and Transportation Officials*  
*Association of Metropolitan Planning Organizations*  
*American Trucking Associations*  
*Coalition for American's Gateways and Corridors*  
*Intermodal Association of North America*  
*Inland Rivers Ports and Terminals Associations*  
*National Association of Manufacturers*  
*National Association of Regional Councils*  
*National Association of Waterfront Employers*  
*The National Industrial Transportation League*  
*National Retail Federation*  
*Retail Industry Leaders Association*  
*U.S. Chamber of Commerce*  
*Waterfront Coalition*  
*World Shipping Council*

FSC has been described as a “fractured family” of competitors and collaborators, a mixture of private and public interests not always in agreement, but linked by the common bond of engagement in freight transportation—carriers, shippers and public agencies. When SAFETEA-LU was being crafted, FSC was said to have been better prepared than in past reauthorization efforts, and it offered this nine-point agenda for the new bill.<sup>25</sup>

- ◆ Protect the Integrity of the Highway Trust Fund
- ◆ National Highway System (NHS) Freight Connectors
- ◆ National Freight Advisory Committee
- ◆ Freight Cooperative Research Program
- ◆ Expand Freight Planning Expertise at the State and Local Level
- ◆ Innovative Financing and Tax Incentives Proposals
- ◆ The Borders and Corridors Program
- ◆ Streamline Environmental Permitting for Freight Projects
- ◆ Congestion Mitigation and Air Quality Improvement Proposal

FSC played an important role advocating the inclusion of NCFRP in SAFETEA-LU by making it a part of its program and establishing a constituency of economic and political importance for freight research. The credibility of FSC came from its membership and their individual and collective influence. Those members included some fierce competitors, and their working toward common ends added to the credibility of the coalition. Grounding support for NCFRP in industry, state and local government, rather than a research organization (e.g., TRB), or a federal agency (e.g., FHWA), added weight (economic power), distance (beyond the beltway), and breadth (diversity of interests) to the political support.

In addition to the position of the FSC, both AASHTO and the American Trucking

<sup>24</sup> <http://www.freightstakeholders.org/>, accessed September 2, 2007.

<sup>25</sup> [http://www.intermodal.org/stakeholders\\_files/safetea\\_lu.shtml](http://www.intermodal.org/stakeholders_files/safetea_lu.shtml), accessed September 2, 2007.



Associations advocated the NCFRP as a part of their separate agendas for the reauthorization bill that became SAFETEA-LU.<sup>26</sup>

To secure support for NCFRP, it was not only necessary to convince the Congress; prior to that it was essential to get the backing of the advocacy groups themselves. The diversity of members and their interests within the FSC made building consensus a challenge. While research may not have been at the top of the priority list for every member of the coalition, a general freight research program was something this multi-faceted coalition could agree on. Both highway and transit interests had their sectoral research programs in the National Cooperative Highway Research Program (NCHRP) and the Transit cooperative Research Program (TCRP), both supported with public funds. The establishment of the NCFRP was an easily-argued target for coalition support.

While FSC provided general support for the freight cooperative research program, formally it only advocated one specific research area, the annual collection of freight origin-destination data to support research and policy studies.<sup>27</sup> Thus, the FSC argument in favor of the research program was quite general; rather than promising specific research results, it was based on the importance of the field, its problems, and their connection to the national economy.

### Role of AASHTO

While American Association of State Highway and Transportation Officials (AASHTO) was a part of the FSC, it had its own long history of advocacy for transportation and transportation research. AASHTO senior staff members reported that freight issues, including NCFRP,

were on the AASHTO priority agenda for SAFETEA-LU, and that AASHTO provided some of the language for the bill. And, the AASHTO spokespersons had solid domain knowledge which strengthened their advocacy efforts.

The AASHTO argument for support of freight research was fundamental, focused on importance of the freight sector and its problems, rather than on freight research products: "...11 percent of gross domestic product, 100 percent of the economy depends on freight movement..."

The legislative process that created SAFETEA-LU was extraordinarily long—the bill was approximately two years late in passage. Much of the content of SAFETEA-LU was finally settled in the conference committee that worked feverishly at the end of the process. Which advocates were still standing at that point was important in determining what components of the bill survived. The FSC remained in support, but some say this group was less unified because of issues of modal competition and concerns about diversion of highway trust funds to other modes and uses. Perhaps more importantly, in contrast to AASHTO, FSC did not have the staff infrastructure to keep representatives working in Washington during all of the SAFETEA-LU deliberations.

AASHTO stayed with the legislative process throughout the conference committee negotiations. Since the conference committee works behind closed doors, the key advocacy work had to be done in advance of, and outside of, the committee deliberations. The organization and its staff have an established relationship with the Congress and its relevant committees. Senior AASHTO representatives talked regularly to members of the House Transportation and Infrastructure Committee staff. AASHTO's credibility comes from the entities it represents, its long-term engagement in transportation advocacy, and its service as a reliable source of information, both offered (pushed) and in response to queries (pulled).

<sup>26</sup> Freight Transportation Strategies Needed to Address Planning and Financing Limitations, General Accounting Administration Report to the Committee on Environment and Public Works, U.S. Senate, December, 2003, GAO-04-165, pp. 72-73.

<sup>27</sup>[http://www.intermodal.org/stakeholders\\_files/documents/Cooperative percent20Research percent20Program.pdf](http://www.intermodal.org/stakeholders_files/documents/Cooperative%20Research%20Program.pdf), accessed September 2, 2007.

As one AASHTO staffer put it: "...you can't start this (advocacy) in the 11<sup>th</sup> hour - that gets peoples' [negative] attention... the relationship [with the Congress] is based on exchange. We've done stuff for them, given them information, answered questions..."

The final version of SAFETEA-LU contained this non-restrictive research agenda for NCFRP:<sup>28</sup>

The national research agenda required... shall include research in the following areas:

- ◆ Techniques for estimating and quantifying public benefits derived from freight transportation projects.
- ◆ Alternative approaches to calculating the contribution of truck and rail traffic to congestion on specific highway segments.
- ◆ The feasibility of consolidating origins and destinations for freight movement.
- ◆ Methods for incorporating estimates of international trade into landside transportation planning.
- ◆ The use of technology applications to increase capacity of highway lanes dedicated to truck-only traffic.
- ◆ Development of physical and policy alternatives for separating car and truck traffic.
- ◆ Ways to synchronize infrastructure improvements with freight transportation demand.
- ◆ The effect of changing patterns of freight movement on transportation planning decisions relating to rest areas.
- ◆ Other research areas to identify and address emerging and future research needs related to freight transportation by all modes.

<sup>28</sup> Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy For Users, 109th Congress Public Law 109-59 SEC. 5209. [http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=109\\_cong\\_public\\_laws&docid=f:publ059.109](http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=109_cong_public_laws&docid=f:publ059.109), accessed September 2, 2007.

This agenda was said to have been added by AASHTO to provide some specificity in the bill. The list is a broad compendium of topics that were both representative of freight issues and non-controversial; there is no evidence that this was a consensus agenda emanating from the FSC. The program components focus on relationships, methods, and policies rather than infrastructure and hardware research, areas which presumably were already well supported through on-going government and industry efforts.

Proof of the effectiveness of the NCFRP advocacy effort is illustrated by the failures of other freight program components, which showed that Congress was not buying everything on the freight agenda. For example, the FSC-advocated investment program in intermodal connectors was not funded, nor was its proposed National Freight Advisory Committee established.

The Chicago Region Environmental and Transportation Efficiency program (CREATE), intended to increase the efficiency of this primary railroad hub, was supported at only \$100 million in contrast to the \$600 million requested.

In NCFRP Congress bought a modest, neutral program, one less risky than an investment in one of several competing modes, but perhaps a program less appealing than earmarks that sent resources back to their districts. This underscores the challenge of public investments in freight programs: competing interests make it difficult to find common ground in the freight arena. NCFRP seems to have offered that common ground.

### **Feasible Implementation Plan**

NCFRP was supported with an understanding that it would be operated in a similar manner to the already-successful NCHRP and TCRP, which were models of efficiency, sustainability, and responsiveness to their constituencies. This provided a well-defined and proven implementation strategy. The responsiveness of the research agenda to the interests and needs of this constituency was

ensured by the requirement for a program Oversight Committee representing both private and public sector interest.<sup>29</sup> Its relatively modest investment level—about 0.04 percent of the SAFETEA-LU package—meant that NCFRP was not a major threat to other favored projects.

- ◆ Feasible program with proven implementation path – at a scale consistent with the need, and an operating plan that ensured success.

### **A Champion for Freight Research**

AASHTO, alone and in conjunction with the Freight Stakeholders Coalition, appears to have been the ultimate champion for the NCFRP. While the FSC was a more broadly-based group, it was less unified on SAFETEA-LU, and AASHTO had a much longer history, a strong and deep staff commitment to the program, and the resources to continue advocacy of its legislative program up to the point of passage of the bill.

This case illustrates the importance of a strong and consistent champion for the research program. The Freight Stakeholders Coalition was an important, high credibility advocate for the NCFRP; AASHTO, as the lead advocate with a long record of high impact success, made a strong commitment to NCFRP. Among the keys to securing support for NCFRP were these:

- ◆ Credible advocacy group representing the key stakeholders – multi-faceted, an industry statement rather than the view of a single firm.
- ◆ Arguments focused on issues of broad, current, national interest – not parochial in terms of businesses or locations.
- ◆ Consistent advocacy – not a last minute thing – but based on a long-term relationship between the Congress and the advocacy groups.
- ◆ Credibility earned through exchange of information – collaborative advocacy groups responding freely to information requests and offering high quality advice.

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<sup>29</sup>[http://www.trb.org/shrp2/SHRPII\\_OversightCommittee.asp](http://www.trb.org/shrp2/SHRPII_OversightCommittee.asp), accessed September 9, 2007.

## **Persons Interviewed**

Christina Casgar (at the time Federal Highway Administration, currently, Goods Movement policy Manager, San Diego Council of Governments), telephone interview, July 6, 2007 and follow-up in August 2007.

Leo Penne (Program Director, Intermodal and Industry Activities, American Association of State Highway and Transportation Officials), personal interview, July 18, 2007.

Jean Godwin (Freight Stakeholders Coalition and Executive Vice President/General Counsel, American Association of Port Authorities), email exchange, September 6, 2007.

Robert Reilly (Former Director, National Cooperative Highway Research Program, Transportation Research Board - retired), telephone interview, April 28, 2007.

## CHAPTER 5: ANALYSIS OF THE COMMUNICATIONS PROCESS

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### Introduction

The goal of Task 5 was to develop a strategic communications plan or process that describes the key elements for communicating and selling the value of transportation research. In this chapter, we present our analysis of the communications process and the conclusions from which the guidebook on Communicating the Value of Transportation Research was developed.

### Advancing and Communicating Value

Transportation research programs and projects can be a tough sell. In concept, everyone appreciates the value of information and innovation, but that appreciation does not lead directly to support for research or buy-in to apply newly proven technologies or policies for a number of reasons. The payoffs from transportation research are often in the long-term, while decision-making and budgetary cycles operate in shorter time frames. Sometimes communicating the benefits of research (as yet undone) is difficult since the linkage to improved safety, mobility, or decision-making might be indirect or ambiguous.

Yet, in the interviews conducted in Tasks 1 and 2 and in the case studies completed in Task 4, we heard and found examples of advocates of transportation research programs and projects who were successful in communicating their value, and thus were able to influence decision makers. The word “value” was instrumental in their success. What does value mean? Dictionary definitions include words and phrases like “worthwhile,” “desirable,” and “a suitable equivalent for something else.” “Worthwhile” is the key word here. Like anything else, transportation research is considered valuable when its outcome is perceived to be worth an amount equal to or greater than the funds spent on it. This exchange process is a fundamental concept in communications. With strategies, messages, and other tools, communications affect the exchange process on many levels.

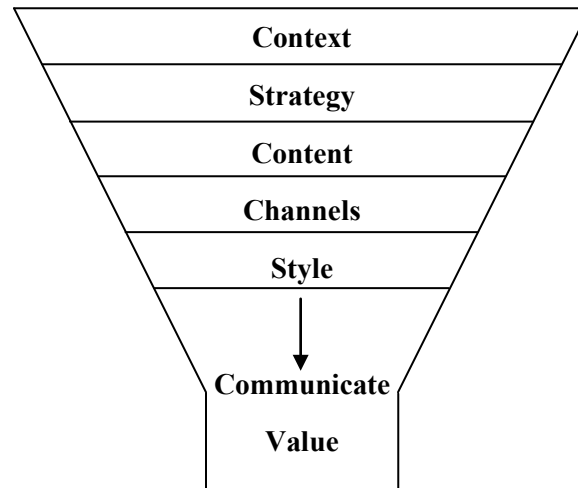
Communicating value is more than providing numbers—the quantitative side of value—statistics and dollars measured in cost-benefit formulas. Decision makers assess value in terms of the perception of the importance and worthiness of the expected outcomes, and this perception is informed and influenced by a skillfully applied communication process. It is the invisible, intangible perceptions that people form and remember that can mean the difference between a transportation research program or project getting funded or dropped. Embarking on a program to influence perceptions and establish value requires careful planning, diligence, and patience. It is not a one-shot campaign, nor can it be executed at the last second—when funding decisions are about to be made. Above all, the effort does not focus on promotion alone; brochures, e-news-letters, and presentations are not the sole answers. Establishing and communicating value is a process that must purposefully consider five key elements—context, strategy, content, channels, and style.

### Communications Process

Each of the case studies starts with the identification of an “issue to sell.” This is important because fundamentally this NCHRP project is about how transportation professionals communicate value (or sell value) to influence the perceptions of decision makers. Our case studies represent seven real-life examples of how this has been done. In reviewing the case studies one of the first things that will stand out is that “selling the value” was done slightly differently in each case. These case studies led us to a generic process for communicating the value of research, represented by the funnel diagram shown in Figure 5-1. This funnel represents the fact that communicating the value of research is a multi-layer challenge—the outer layers of context, strategy, and content are just as, or even more,

important than the inner layers of communication channels and style. The paragraphs below explain each of the elements of the Figure 5-1 funnel.

**Figure 5-1: Generic Process for Communicating the Value of Research**



### **Context—Situational Analyses**

The context in which communication takes place—including the problem to be addressed by the proposed research—influences the choices made as to strategy, content, channels, and style. Communication is frequently a response to a particular situation and is often related to a history of events and perhaps socio- (or cultural)-political considerations that need to be identified. For example, the case study about California’s Seismic Bridge Retrofit indicated that the catalyst that motivated the research and defined its value was the problem—earthquakes. Their occurrence and the threats to life and safety presented the need for and sparked interest in research. However, the research decision makers still had to be considered—they included top management from the California Department of Transportation (Caltrans), the Governor’s Department of Finance, the Legislative Analysts Office, individual Legislators and various research funding groups. These decision makers needed easy access to clear information; visuals rather than textual descriptions often made communications with them more efficient. The political situation in which communication takes place also needs to be considered. As another example, transportation research programs that have (or will have) their birth in legislation often raise issues about public visibility, tradeoffs against other, perhaps more popular programs, as well as particular format and language. Thus, learning what the audience deems as politically acceptable is part of the communication process. In the Oregon case study, a key element of the communication strategy was “transparency,” because the policy options would have very direct and visible effects on the public—as opposed to the earthquake research, the effects of which would be somewhat less direct. Because of the socio-political climate, the success of the mileage-based fee program was dependent upon building trust and demonstrating accountability.

### **Strategy—How and What for Whom**

Strategies for communicating value depend upon understanding the audience (audience analysis and type of audience) and the purpose of the communication. Since the goal of communication is to influence value perceptions, strategy depends on developing a clear understanding of who must be

influenced and what their values are – value profiles. The value profile identifies the criteria the audience will use to evaluate the exchange of information. The objective is to gain an in-depth understanding of how members of the target audience determine value, what comprises value for them, and how they express it. In the ACS-Lite case study, to encourage private industry collaboration, the Federal Highway Administration (FHWA) research team offered an incentive (a “carrot”) to major industry players—this carrot was identified by understanding what comprised value for these major industry players. This incentive turned out to be a better product and low development cost—resulting from participating in the research with fellow competitors.

When developing a communications strategy, it is important to think about the goals to be achieved and how various elements can contribute to those goals. In addition to any specific objectives related to the transportation research program or project, important communication goals include announcing, motivating, educating, informing, and supporting decision-making. In the Task 4 case studies, generally the main objectives of the communications were to inform and influence decision makers. This included attracting the attention of decision makers, convincing them to take action, or persuading them that a research program or project deserved funding. For example, external communications conducted by Virginia Transportation Research Council (VTRC) public affairs staff were as important as the interagency communication outlined in the fiber-reinforced polymer bridge deck case study that helped secure the Innovative Bridge Research and Construction (IBRC) grant dollars to fund the research. Their strategy for external communication focused on bringing the return on investment (ROI) of transportation research to the public’s and government’s attention to ensure that federal and state Legislators would continue to provide the research divisions and others the necessary resources to conduct more innovative research.

### **Content—What to Include**

The content of the message does not stand alone, but depends on both the context and the strategy. Selecting accurate and appropriate content is critical. If content is inappropriate, the audience is likely to dismiss the communications, and if content is overly complex, the audience will disregard it completely. If content is inaccurate, communications lose all credibility. Determining the appropriateness of content involves considering the target audience and their values and the action to be advocated. While not overtly considered, the communications represented by the case studies followed the standard principles of rhetoric. Aristotle defined rhetoric as the art of "discovering all available means of persuasion in any given case" and classified these means of persuasion into three categories: (1) Ethos - persuading through personality; refers to the trustworthiness and credibility of the speaker, (2) Pathos - persuading by arousing the audience's emotions, or (3) Logos—persuading by the use of reasoning. For example, in the Northwestern University New Bridge Steel case study, researchers used scientific data on proof of performance (logos) and involved a well-respected figure—an emeritus researcher—to add credibility (ethos).

### **Channels—Means of Communication**

We define communication as information transmission for a specific purpose. In this context communication channels can be understood simply as the modes or pathways through which two parties might communicate. As population grows and technology evolves accordingly, these channels of communication change as well. However, there are basically four types of channels: (1) printed or published materials; (2) oral channels (e.g., personal contacts); (3) broadcast media (e.g., radio, TV, videos), and (4) Internet and computer-based modes. The case studies illustrate that all of these types of channels can be used to communicate the value of transportation research. Some channels are especially well-suited for particular contexts. For example, in the case of the innovative bridge steel, the need to influence a small group of readily identified technical experts called for face-

to-face communications. Personal channels were also integral to building Congressional support for the National Cooperative Freight Research Program (NCFRP). For example, American Association of State Highway and Transportation Officials (AASHTO) spokespersons with solid domain knowledge played a critical role in securing the NCFRP mandate in SAFETEA-LU. Senior AASHTO representatives talked regularly to members of the House Transportation and Infrastructure Committee staff. They used hard-won credibility on the Hill to effectively advocate for NCFRP. “The relationship with the Congress is based on exchange. We’ve done stuff for them, given them information, answered questions.” On the other hand, it was effective use of broadcast media in the development of Oregon’s mileage fee concept and pilot program that facilitated the Task Force’s communication with the public and engendered its continuing support. The interviews requested by every mainstream media reporter were granted, and as much time was given during the interview as was desired by the media reporter. The idea was to communicate regularly and often – nothing was hidden from the public or other stakeholders. The Oregon case study also relied heavily on the Internet; it never published a print document on the program. The Task Force and Oregon DOT (ODOT) relied on an interactive Website as the primary vehicle for an exchange of information with the public, program supporters, and program detractors.

### **Style—Look and Feel**

Style might be considered the packaging of the communications. With the word “packaging” most people think of the physical wrapping or features that distinguish one communications activity from another. As the most visible aspect of packaging, physical features (such as design, layout, color, and typeface for printed materials for example) do affect perception of value. Whether it is through the thickness of a report, the arrangement of images and text on a Website, or the folder used to house fact sheets, every encounter between a member of the audience and the transportation research advocate is immediately influenced by physical packaging. Complementing physical packaging are the less tangible attributes that speak directly to the value criteria of the target audience. Features such as timeliness, scope, insight, and analysis are also packaging attributes. Packaging can deliver other value messages, such as professionalism, pride in the research program and confidence that it will succeed. In the Virginia case study, VDOT and VTRC required IBRC funding from FHWA. When presenting their research findings to FHWA to secure that funding, the agencies focused on making clear and concise presentations. These were not necessarily simple presentations but presentations in a format where the important aspects of the research were highlighted and brought to the attention of the evaluators. Another example of effective use of style was their PowerPoint files, which outlined step-by-step explanations of the technology, the research, and tests conducted and how the technology would improve the transportation infrastructure. Style was an important consideration in the Missouri case study on median cable barriers. Selling the benefits of guard cable to MoDOT upper management was important for statewide implementation. MoDOT staff involved in this process understood that senior management may have only five minutes to spend on the topic so they focused on being clear and basic in words and graphics. In PowerPoint presentations, they acknowledged how much time their audience would give to them and used less than one slide per minute of time. The California case study illustrated how vital the guidelines of “simple and concise” are when attempting to influence decisions on technical issues by non-technical individuals. Illustrative examples from this case study included visual demonstrations of structure tests and other experiments and key graphics that created visual relationships between data and decisions. In the former example media and decision makers were invited to observe tests of structural elements; in the latter, graphics were specifically designed to “persuade” rather than just describe.



## Case Study Syntheses

Table 5-1 presents a synthesis of the communication process elements related to the seven case studies conducted in Task 4 as well as to the passage of SAFETEA-LU (Task 2). Full case study documentation is included in Chapter 4. The SAFETEA-LU documentation was previously provided in Working Paper #1 (May 2007). The case studies are identified by number and title as noted below:

1. Adaptive Control Software (ACS) Lite
2. Northwestern University New Bridge Steel
3. California Seismic Bridge Retrofit Program
4. Virginia Fiber-Reinforced Polymer Bridge Deck
5. Missouri Statewide Installation of Median Cable Barriers
6. Oregon Mileage Fee Concept and Road User Fee Pilot Program
7. National Cooperative Freight Research Program (NCFRP)

It is apparent from the information in Table 5-1 that the majority of the researchers and other transportation professionals involved in the SAFETEA-LU and Task 4 case studies did not focus as much on “style”—the final element in the communication process—as much as other elements. Almost in direct opposition to this finding are the results of our Task 6 analysis. In the analysis of communications in industries and disciplines outside of transportation, we found much more evidence of a focus on style.

The difference may be explained by our effort to *cast a broader net* in our research by looking explicitly at matters of context and strategy. This resulted in the research *catching bigger, and different fish*. It is not that content and style are unimportant in advocating transportation research; instead, understanding the larger picture, and accepting the notion that all of the components of the communications process are necessary for success, are important to support transportation research decisions.

**Table 5-1: Case Study Synthesis**

Case Study	Context	Strategy	Content	Channels/Style
<p><b>SAFETEA-LU</b></p> <p>Issue to sell: The value of maximizing the transportation research component of SAFETEA-LU.</p>	<p>SAFETEA-LU reauthorization debate took place over 2 years and 12 extensions – long enough for significant issues to percolate until time of action by Congress. Political and mathematical processes converged to shrink the level of funding for transportation research.</p>	<ul style="list-style-type: none"> <li>▪ Present a grand vision</li> <li>▪ Build a coalition of partners and allies with shared voice and interest</li> <li>▪ Nurture a relationship with the audience</li> <li>▪ Link problems to solutions in a clear and simple way</li> </ul>	<ul style="list-style-type: none"> <li>▪ Create a connection with audience with messages that “stick” and with illustrative success stories</li> <li>▪ Use content that is “fresh,” and timely</li> <li>▪ Address critical issues</li> </ul>	<ul style="list-style-type: none"> <li>▪ Personal contact: Allies in the decision-making circle</li> <li>▪ Personal contact: Work from within—lobbyists, another legislator or elected official who can champion the issue</li> <li>▪ Personal contact: Face-to-face meetings</li> <li>▪ Print: Short, graphic-heavy, and crisply written “leave behind” documents</li> </ul>
<p><b>1-Adaptive Control Software (ACS) Lite</b></p> <p>Issue to sell: The value of building public – private partnerships to advance signal software development.</p>	<p>Congestion in urban areas was worsening and becoming a political issue. Poor signal timing accounted for 5-30 percent of arterial congestion. Deployment costly.</p>	<ul style="list-style-type: none"> <li>▪ Link problem to a single, viable solution for the good of the nation</li> <li>▪ Offer an attractive carrot (better product / lower development cost) to the major industry players to offset risk of participating with competitors.</li> <li>▪ Use “timing” to advantage</li> </ul>	<ul style="list-style-type: none"> <li>▪ Advocate ACS-Lite as solution to congestion in small and mid-sized systems.</li> <li>▪ Inform public agencies of contribution of poor signal timing to congestion</li> </ul>	<ul style="list-style-type: none"> <li>▪ Personal contact: Champion to speak to decision makers and technical researchers</li> <li>▪ Personal contact: Industry group: National Electronic Manufacturers Association</li> <li>▪ Internet: Website to announce results of technical implementation</li> </ul>
<p><b>2-Northwestern University New Bridge Steel</b></p> <p>Issue to sell: The value of previous research to convince implementers to use new technology.</p>	<p>Bring new (however improved) steel to market – difficult challenge. Implementing results of research, changing the way something is built, requires collaboration and cooperation among numerous actors.</p>	<ul style="list-style-type: none"> <li>▪ Show that application of new steel is feasible and desirable.</li> <li>▪ Strong advocate who is independent but has stake in implementation process.</li> <li>▪ Involve decision makers during product development, testing and certification.</li> <li>▪ Develop and utilize personal relationships with decision makers</li> </ul>	<ul style="list-style-type: none"> <li>▪ Promote product attributes to secure first application in a real-world example</li> <li>▪ Share data on product tests and certification</li> <li>▪ Address feasibility and proof of performance</li> </ul>	<ul style="list-style-type: none"> <li>▪ Personal contact: Champion in IDOT</li> <li>▪ Personal contact: Face-to-face communications with steel research, certification, supplier, and potential user communities</li> <li>▪ Personal contacts: Presentations at technical conferences</li> <li>▪ Printed materials: Scholarly papers and reports</li> <li>▪ Broadcast media: Press coverage</li> </ul>

Case Study	Context	Strategy	Content	Channels/Style
<p><b>3-California Seismic Bridge Retrofit Program</b></p> <p>Issue to sell: The value in diverting funding from existing transportation programs to support new research on seismic retrofit treatments for bridges.</p>	<p>Research-confirming events (earthquakes) that followed years of investigation, testing and deployment.</p>	<ul style="list-style-type: none"> <li>▪ Frame issue around serious threat and significant shared concern</li> <li>▪ Build partnerships and coalitions with sponsors, researchers, agencies and utilities early in the process</li> <li>▪ Promote research program transparency through routine dissemination information</li> <li>▪ Ensure rapid implementation of research findings</li> <li>▪ Peer review of papers</li> <li>▪ Rapid reporting of research results</li> </ul>	<ul style="list-style-type: none"> <li>▪ Push simple, concise information to non-technical decision makers, media, and public</li> <li>▪ Keep the message simple and focused</li> <li>▪ Made a virtue of uncertainty – precise data were not always available when early decisions to invest in research needed to be made; this fact was used to the advantage of the researchers in communicating with decision makers.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Personal contacts: Involve diverse experts from all audiences in problem solving</li> <li>▪ Personal contacts: Open meetings and tests</li> <li>▪ Broadcast and Computer-based: Key graphic displays (including video and slides showing the problems, test results and new designs)</li> <li>▪ Printed materials: Short summaries of projects</li> <li>▪ Personal contacts: Decision makers as “investment advisors” to sift through technical expert advice to inform funding decisions</li> </ul>
<p><b>4-Virginia Fiber-reinforced Polymer Bridge Deck</b></p> <p>Issue to sell: The value of funding polymer bridge technology and deploying it throughout the state.</p>	<p>IBRC program provides direction and funding to state DOTs to develop and implement innovative technologies and materials in bridge repair. Aging infrastructure a critical issue in transportation. Hawthorne Bridge prime candidate for first deployment of fiber-reinforced polymer and new adhesive bonding technique.</p>	<ul style="list-style-type: none"> <li>▪ Select relevant project (rehabilitate a historical structure).</li> <li>▪ Cast solution (technology) as an effective fix for a transportation deficiency</li> <li>▪ Build relationships with allies to bring issues to FHWA</li> <li>▪ VTRC as an independent research voice</li> </ul>	<ul style="list-style-type: none"> <li>▪ Present research findings clearly and precisely to highlight lab reports and field tests</li> <li>▪ Measure and promote success</li> <li>▪ Communicate how technology will improve transportation infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>▪ Personal contact: Research and construction teams held frequent meetings</li> <li>▪ Broadcast: Media relations to increase public awareness</li> <li>▪ Printed materials: News releases</li> <li>▪ Computer-based: PowerPoint files outlining step-by-step explanation of technology, research, and tests, and benefits</li> <li>▪ Personal contact: Ribbon-cutting ceremony</li> </ul>

Case Study	Context	Strategy	Content	Channels/Style
<p><b>5-Missouri Statewide Installation of Median Cable Barriers</b></p> <p>Issue to sell: The value of statewide installation of median cable barriers.</p>	<p>MoDOT focus on a statewide solution to a specific crash type; new focus on safety</p>	<ul style="list-style-type: none"> <li>▪ Frame issue as a statewide problem and new and noteworthy solution</li> <li>▪ Install at test sites that can be references of success</li> <li>▪ Continuous and unashamed advocacy</li> </ul>	<ul style="list-style-type: none"> <li>▪ Target information to audience—keep it short and concise and use graphics</li> <li>▪ Promote early research findings and use test sites as success stories</li> <li>▪ Promote new installations to generate visibility, interest and demand</li> <li>▪ Allow time for questions to learn what is important to audience</li> </ul>	<ul style="list-style-type: none"> <li>▪ Personal contact: New director, with a focus on “saving lives” (personal interest) as champion</li> <li>▪ Printed materials: Reports and technical materials</li> <li>▪ Personal contacts: Simply talking with others higher up in organization</li> <li>▪ Broadcast: Use media sources to keep products visible to public</li> <li>▪ Personal contacts: Papers and presentations at conferences</li> </ul>
<p><b>6-Oregon Mileage Fee Concept and Road User Fee Pilot Program</b></p> <p>Issue to sell: A mileage fee system that ensured a flow of revenue sufficient to maintain, preserve, and improve Oregon’s highway and road system and that was acceptable to the public.</p>	<p>Chair of house committee on transportation concerned that fuel tax might become declining revenue source for Oregon’s road system. Passage of HB-3946 mandated task force to design a replacement revenue collection system</p>	<ul style="list-style-type: none"> <li>▪ Focus on an innovative and experimental issue/program requiring high-intensity education</li> <li>▪ Advocate fearlessly to anyone who would listen and learn</li> <li>▪ Offer total accessibility to media, legislators and interactive Website</li> <li>▪ Prepare for interest beyond Oregon—national and international</li> <li>▪ Reassess continuously</li> </ul>	<ul style="list-style-type: none"> <li>▪ Educate the public about why Oregon is pursuing this</li> <li>▪ Post all process documents and report all decisions on Website (i.e., transparency)</li> <li>▪ Note audience questions to continuously evolve presentations</li> <li>▪ Teach allies fundamentals of approach so they can be advocates</li> </ul>	<ul style="list-style-type: none"> <li>▪ Interactive Website—reliance on Web over paper public documents</li> <li>▪ Personal contacts: Task Force Director served as key spokesperson and program champion</li> <li>▪ Personal contacts: Open meetings of the Task Force</li> <li>▪ Personal contacts: Geographically diverse public hearings</li> <li>▪ Broadcast: Media reports, news articles, editorials, radio interviews</li> <li>▪ Internet: 100 percent response to all emails</li> </ul>
<p><b>7-National Cooperative Freight Research Program (NCFRP)</b></p> <p>Issue to sell: The value of a national freight research program</p>	<p>Congressional support sought to create a federally sponsored freight research program with SAFETEA-LU.</p>	<ul style="list-style-type: none"> <li>▪ Confirm growing public interest and insufficiency in addressing them</li> <li>▪ Establish Freight Stakeholders Coalition as a credible advocacy group that embraces a multi-faceted industry viewpoint</li> <li>▪ Build relationships with audiences, providing, long-term interaction</li> </ul>	<ul style="list-style-type: none"> <li>▪ Focus arguments on issues of broad national interest</li> <li>▪ Promote success stories</li> <li>▪ Use TCRP and NCHRP as models for success; focus on how NCFRP differs</li> <li>▪ Earn credibility through exchange of information</li> </ul>	<ul style="list-style-type: none"> <li>▪ Personal contact: AASHTO as champion</li> <li>▪ Personal contact: FSC built long-term relationship with Congress</li> </ul>

## Audience Information Needs and the Communication Process

Findings from the case studies were consistent with the information that was developed in the Task 1 and Task 2 interviews. The interviews conducted in Task 1 were used to abstract the information needs (i.e., content preferences) and preferred channels for the audiences that need a better understanding of the value of transportation research. The findings from these interviews are synthesized in Table 5-2. Task 2 involved interviewing people responsible for justifying and explaining transportation research to determine the communication strategies and messaging strategies that have been used. Table 5-3 contains the variety of recommendations for content and channels strategies.

In reviewing the information in the seven case studies, the SAFEETEA-LU case study, and the interviews with audience and program managers, several broad observations related to the communication process emerged, along with a number of common threads or attributes of effective communication practices. These broad observations for effective communication are summarized below.

- The context
  - Recognize that context matters.
  - Define the relevant issue or need.
    - What is the issue affecting? And who?
    - Why is this the right time to tackle it or raise awareness of it?
  - Identify and understand the target audience.
  - Make a connection between the research and their interests, constituencies, or business goals.
- The strategy
  - Establish the goal and define a “strategic space” for flexibility of action.
  - Understand the value profile: Communicate to influence value perceptions.
    - How do decision makers determine value?
    - What comprises value for them?
    - How do they express it?
  - Identify relevant benefits: Link the need/issue to the research outcomes.
    - Emphasize the “greater good” benefits.
    - Communicate the national value or grand vision of the research.
    - Present no hidden, self-serving agendas.
  - Build relationships with *allies* and *champions* of the issue / research.
    - Build broad coalitions of advocates for the research.
    - Identify potential, credible and effective allies and champion candidates, and enlist their support.
    - Where possible, work from within.
  - Build two-way relationships with decision makers.
    - Establish a basis for exchange or reciprocity: Successful communications are built on giving useful information as well as getting it.
    - Develop a communication strategy that is timely, frequent and keeps the issue fresh.

- Promote interactive communications: Listen, observe, evaluate, and respond.
- The content
  - Develop communication messages; tailor the messages to the audience and their technical levels.
    - Where appropriate and feasible, hire professional communicators or lobbyists.
  - Derive content naturally from context and strategies.
    - Use multiple messaging tactics – use all standard principles of rhetoric.
    - Provide research-based information.
    - Identify “sticky” messages, e.g., demonstrating benefits in terms of resolving problems, saving lives, increasing efficiency, etc.
    - Tailor the “ask” to the current mood and concerns of the audience and/or constituent interests.
    - Provide illustrative success stories; personalize when appropriate.
- The channels
  - Select and use the most effective channels for communicating with each audience.
  - Consider audience needs, resources and abilities.
  - Tailor the message and the style to the channel.
  - Ensure that information is readily available to decision makers.
- The styles
  - Packaging matters – consider design, layout, and color.
  - Err on the side of brevity.
  - Present information in straight-forward, easy-to-understand language.
  - Emphasize graphics over text.
  - Use dynamic presentations or visualizations, where appropriate.

These processes are typically cyclical. Advocating support for even a single research project or program usually takes an extended period of time. In this process there are opportunities to learn, adapt, and improve the process. This calls for continuous reassessment of the context definition, and concomitantly of strategy, content, channels and style.

All of the results of this analysis confirm the importance of these components of the communications process. While every context and problem is different, process requirements, and the communications keys to success are strongly similar: know the context, problem and audience; develop a logical and appropriate, and feasible communications strategy emphasizing relationships and effective advocacy; prepare content that respects the context and conveys the messages salient to the values of the audience; select the several communications channels that make it easy for the audience to get the message; and use styles that are accessible to and match the needs and abilities of the audience.

**Table 5-2: Summary of Audience Interviews (Task 1)**

Audience	Content	Channels	Style
Congressional Members	<ul style="list-style-type: none"> <li>▪ Research contributes to important problem being solved</li> <li>▪ Up-front benefits to the constituency of the decision makers.</li> <li>▪ What's been accomplished in the research programs</li> <li>▪ What the research spending gets them (Congress)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Print: Written handouts or correspondence</li> <li>▪ Print: Newsletters</li> <li>▪ Personal: Face-to-Face meetings</li> <li>▪ Personal: Phone (not cold calls)</li> <li>▪ E-mail – once relationship is established.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Accessible</li> <li>▪ Short (one page)</li> <li>▪ Main points up front</li> <li>▪ Non-technical language</li> </ul>
Congressional Staffers	<ul style="list-style-type: none"> <li>▪ Come with a “request”</li> <li>▪ Definition of legitimate issues that have broad consensus</li> <li>▪ Up-front benefits to the constituency of the decision makers.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Personal: In-person meetings or gatherings</li> <li>▪ Personal: Testimony at hearings; events or symposiums aimed at building rapport and idea exchange</li> <li>▪ Personal: Source that can serve as an in-house resource on technical issues</li> <li>▪ Print: 1-2 page leave behind that is not quite a “white paper”</li> </ul>	<ul style="list-style-type: none"> <li>▪ Short (one page)</li> <li>▪ Main points up front</li> </ul>
Media	<ul style="list-style-type: none"> <li>▪ Data or research that confirms or denies suppositions (e.g., studies that prove that more time in traffic is detrimental to productivity)</li> <li>▪ New elements or perspectives on an issue</li> <li>▪ Compelling, timely research results</li> <li>▪ Main point and why it matters to audience.</li> <li>▪ Source determines the value (inclined to look more closely at research from federal/state governments or from universities)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Print: Press releases</li> <li>▪ E-mails (with follow-up phone calls)</li> <li>▪ Broadcast: Wire service</li> <li>▪ Personal: Phone calls</li> <li>▪ Print: Copies of studies</li> <li>▪ Personal: Someone who can speak to the research—critical to television media</li> </ul>	<ul style="list-style-type: none"> <li>▪ Executive summary</li> <li>▪ Short</li> <li>▪ Clear, non-jargon language</li> </ul>
State DOT Executive	<ul style="list-style-type: none"> <li>▪ Identification of best practices</li> <li>▪ International scans</li> <li>▪ Research that is directly supportive of business plan</li> <li>▪ Anecdotal success stories</li> <li>▪ Illustrations of user benefits or cost savings</li> </ul>	<ul style="list-style-type: none"> <li>▪ Print: Reports and publications</li> <li>▪ Computer-based: PowerPoint presentations</li> <li>▪ Personal: TRB Presentations (primary sources for best practices)</li> </ul>	<ul style="list-style-type: none"> <li>▪ None identified</li> </ul>
State DOT Public Information Officer (PIO)	<ul style="list-style-type: none"> <li>▪ How research is looking at innovative methods to save lives, conserve fuel, and increase efficiencies.</li> <li>▪ Demonstrate value of research no matter who conducts the research</li> <li>▪ Explain benefits</li> <li>▪ Information PIOs can use to educate local officials and/or develop liaison between researchers and decision makers</li> </ul>	<ul style="list-style-type: none"> <li>▪ Print: Reports of research from other programs or transportation centers</li> <li>▪ Print: Brochures</li> <li>▪ Computer-based: PowerPoint presentations</li> </ul>	<ul style="list-style-type: none"> <li>▪ Clear, to-the-point language</li> <li>▪ Important points up-front</li> </ul>
Implementers	<ul style="list-style-type: none"> <li>▪ Real need for behavioral (evaluative) research.</li> <li>▪ What is important about the research</li> <li>▪ Connections to legislative mandates</li> </ul>	<ul style="list-style-type: none"> <li>▪ Print: Publications</li> </ul>	<ul style="list-style-type: none"> <li>▪ Attractive publications.</li> </ul>

**Table 5-3: Summary of Interviews with Transportation Research Program Managers (Task 2)**

Research Program	Content	Channels
Cooperative Research Program	<ul style="list-style-type: none"> <li>▪ Showcase research results</li> <li>▪ Disseminate research impacts</li> <li>▪ Process driven by customer needs with established program input channels from state DOTs (particularly chief engineers)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Anecdotal success reports (case studies) <a href="http://www.tfhrc.gov/pubrds/marapr98/shrp.htm">http://www.tfhrc.gov/pubrds/marapr98/shrp.htm</a></li> </ul>
TRB	<ul style="list-style-type: none"> <li>▪ Anecdotal success reports (case studies).</li> <li>▪ Dramatic powerful stories</li> </ul>	<ul style="list-style-type: none"> <li>▪ Print: TR News bimonthly magazine, features timely articles on innovative and state-of-the-art research and practice in all modes of transportation</li> <li>▪ Print: Research Pays Off articles are periodically included in the Transportation Research News (TR News).</li> <li>▪ Computer-based: Research Pays Off articles are summarized on a CD that is distributed to Congressional Staffers.</li> </ul>
Federal Agency	<ul style="list-style-type: none"> <li>▪ Be visible, show results and success stories.</li> <li>▪ Show return-on-investment of research over time</li> <li>▪ Show research is tied directly to and adds value to the agency's mission – build the business case for research</li> </ul>	<ul style="list-style-type: none"> <li>▪ Internet: Website populated with benefits of research</li> <li>▪ Print: Every research project has a report that is published, put into the public docket</li> <li>▪ Personal: Publish or present technical papers at conferences to share information so the public knows and the manufacturers get an idea of the research activities</li> <li>▪ Broadcast: Press releases through the Public Affairs office.</li> <li>▪ Personal: Internal (to agency) briefings on research findings and conduct an annual review of research</li> <li>▪ Personal: Demonstrate first-hand to Congress members and staff new technologies in the field</li> </ul>



Research Program	Content	Channels
Industry Association	<ul style="list-style-type: none"> <li>▪ Compelling statement with a champion to deliver it</li> <li>▪ Describe transportation research landscape, outline past accomplishments, what could be done, recommend funding levels</li> <li>▪ Tell a story to put the issue on the table—about the problem, needs, cost, and timeframe</li> <li>▪ Success stories; specific examples</li> <li>▪ The “value” (mainly cost savings) that have come from past research</li> <li>▪ Keep message simple—Use language people can understand</li> <li>▪ Push for a single, unified agenda. Look at national interests and trends</li> <li>▪ How research benefits the public—saves lives, saves time</li> <li>▪ Diversity of voices and lots of re-iteration of the message</li> <li>▪ Tell Congress – I’m a constituent. Make it clear what you are asking for</li> <li>▪ Work with university researchers to provide research-based information</li> </ul>	<ul style="list-style-type: none"> <li>▪ Talk to a communications firm to get the best ways to convey your message.</li> <li>▪ Internet: Website. Use technologies (like pod casting and YouTube)</li> <li>▪ Face-to-face meetings with members of Congress or their staff face-to-face; provide information—there is no substitute for this.</li> <li>▪ Print: Newsletter to brief board, Congress, and constituents</li> <li>▪ Personal: Awards program at annual meeting—showcase success</li> <li>▪ Print: Lunch meetings with Capitol Hill staffers during annual meeting</li> <li>▪ Broadcast: Engage the media</li> </ul>
University Transportation Center	<ul style="list-style-type: none"> <li>▪ Need for the research, general economic benefit to be produced,</li> <li>▪ Activities and achievements in all dimensions (research, service, education), specific capabilities of center.</li> <li>▪ Links problems to solutions that are understandable and practical.</li> <li>▪ Success stories from the research-achievements, implementations, impacts and present them in layman’s language.</li> <li>▪ Innovative ideas; move at pace of business.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Print: Short progress report; part of regular stream of direct and indirect with Congress</li> <li>▪ Personal: Close relationship with congress member (will listen to someone from their state)</li> <li>▪ Print: Submit language to be included in bills</li> <li>▪ Internet: Communicate activities and achievements</li> <li>▪ Personal: Presentations on the Hill; invitation to conferences.</li> <li>▪ Personal: Use TRB to communicate.</li> <li>▪ Print: Newsletter and other regular updates.</li> </ul>

## CHAPTER 6: REVIEW OF BEST PRACTICES FROM OTHER FIELDS AND RESULTS OF COMMUNICATIONS RESEARCH

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### Introduction

Task 5 resulted in an understanding of the communications process and set of recommendations for communication approaches and strategies. It is, however, important to compare and contrast this set of recommendations derived from practice within the transportation research field with best practices from other fields and results of communication research. This objective was accomplished through three iterative steps:

- Conduct secondary research using Internet searches to document the extent to which communicating research transcends non-transportation fields by identifying organizations in those fields and documenting their practices and tools for communicating research.
- Interview organizations with exemplary practices in communicating research to gain deeper understanding of their processes, approaches, and tools they rely on.
- Analyze the similarities and differences between the Task 5 findings and the practices of the organizations identified in the previous steps.

The product of this task is an assessment of the ways in which the transportation research community markets its research and products in contrast with how people in other fields market similar ideas and products. For this task, we examined the following examples of “best practice” possibilities.

- **Fundraising Community.** Over the past decade, the concept of ‘moves management’ has gained ascendancy in fundraising and philanthropic circles. The moves management process entails taking a series of steps (moves) with identified prospects. The idea is moving them from attention, to interest, to desire, and back to attention. Essentially, a unique strategy is developed for each prospect. Then, planning contact, implementing moves, and evaluating the success of each move track the progress of the relationship. It's a constantly changing strategy that is refined as the strategy is played out.
- **Knowledge Management.** Most organizations are discovering that you cannot manage knowledge because it is too slippery and it changes too quickly. Knowledge management experts have rediscovered the power of “stories” in communicating the value of data. Stories can communicate a large volume of emotional content in a short time to quickly resonate with the target audience.
- **Social Psychology.** According to “The Tipping Point,” ideas, products, messages, and behaviors spread just like viruses.<sup>30</sup> Similar to medical epidemics, a handful of special people play an important role in starting idea epidemics. They alter the “message” in such a way that extraneous details are dropped and others are exaggerated so that the message itself comes to acquire deeper meaning. From this notion, a typology of communicators can be developed:
  - **Mavens** – These individuals are idea specialists. They are human databanks who are obsessive about details and sharing them with others.
  - **Connectors** – Connectors are people specialists. They know many people from every possible sub-culture and niche. They have an extraordinary knack for

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<sup>3</sup>Gladwell, Malcolm. *The Tipping Point: How Little Things Can Make a Big Difference*. Boston: Little Brown & Company, 2000.

making friends and acquaintances out of everyone from farmers in a village in Ethiopia to vice presidents of international banks. They act as social glue by spreading ideas around.

- Salespeople – These individuals have the skills to persuade us when we are unconvinced by what we are hearing. They are masters of the art of emotional expression and draw people into their own conversational rhythms on a completely sub-conscious level.

The above three practices indicate that “out of the norm” best practices exist that can be used to better communicate the value of research in transportation. The research team conducted an extensive and diverse literature search to find the effective “nuggets” of wisdom from other fields. The best practices selected for comparison were culled against a set of criteria that included evaluative information and research on their effectiveness. The end result gave way to revisions, as well as enhancements, to the recommendations for communication approaches and messaging strategies that were identified in Task 5.

This chapter documents our findings in carrying out Task 6. First, we provide an overview of the secondary research review and using a key outcome of Task 5—the Generic Process for Communicating the Value of Research—we synthesized four organizations’ best practices. This is followed by a discussion of the similarities and differences in communication practices discovered during the Task 6 review. We conclude with broad themes that emerged as a result of this review.

## Best Practice Review

For a focus on best practices, we conducted a review of about twenty organizational Websites of organizations that might communicate about research not related to transportation, and conducted Internet reviews of a number of relevant articles, publications, and other resources related to the topic of communicating research. Based on our Internet review of Websites, we selected seven organizations for an in-depth interview to learn more about their successful research-related communication practices. By identifying these programs as being “successful” we mean their efforts contributed to raising funds for new or future research, gaining buy-in and support from decision makers, turning their research results into policy/action, or deploying their research results in everyday life. These organizations include:

- St. Jude Children’s Research Hospital (St. Jude)
- Susan G. Komen for the Cure (Komen)
- Consultative Group on International Agriculture Resources (CGIAR)
- Association of Fish & Wildlife Agencies (AFWA)
- Case Western Reserve University (CWRU)
- Federation of Earth Science Information Partners (FESIP)
- National Aeronautic and Space Administration (NASA)

Interviews were successfully completed with the first four of these organizations listed above. A list of the Websites and resources we reviewed, a summary of organizational interviews, and examples of Websites and communications materials are contained at the end of this chapter.

The following represents the key observations derived from this secondary research review in comparing differences and similarities between the findings of Task 5 and organizations that have a need to communicate research unrelated to transportation. These findings are organized by the following topics:

- Research Communication Processes
- Communication Channels
- Communication Styles
- Target Audiences

### **Research Communications Processes**

A major observation resulting from the secondary research review is that organizations that communicate research in non-transportation issues follow similar tenets in carrying out their communications efforts, many of them through very formal programs but some more informal. Their processes are very similar to the generic process outlined in Chapter 5.

To illustrate this, Table 6-1 presents a synthesis of the communication processes followed by the four organizations we interviewed.

**Table 6-1: Organizations' Communications Processes**

Organization	Context	Strategy	Content	Channels/Style
<p><b>St. Jude Children's Research Hospital</b></p> <p>Issue to sell: The value of research to donors and potential donors and end-users of the research.</p>	<p>St. Jude's basic and clinical research advances treatment and prevention of catastrophic diseases in children and to improve their survival rate.</p>	<ul style="list-style-type: none"> <li>▪ Team scientific editors and designers with researchers to produce effective publications and manuscripts.</li> <li>▪ Create portals for sharing advancements with researchers worldwide.</li> <li>▪ Develop partnerships with medical institutions and fund-raising organizations to recruit support for key programs.</li> <li>▪ Use telecommunications to link programs and professionals to learn from and assist each other.</li> <li>▪ Build relationships with media to advance stories and news on fundraising events and programs that benefit the hospital.</li> <li>▪ Use the St. Jude Brand.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Provide simple, easy to digest facts and updates on research and identify the principal investigator.</li> <li>▪ Demonstrate research saves lives, provides better or new treatments.</li> <li>▪ Frequent updates focusing on research results and direct impacts.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Website :Portals such as Cure4Kids portal for information transfer between clinicians and scientists.</li> <li>▪ Multimedia: Engaging interactive presentations, videos and media interviews available from Internet Media Center.</li> <li>▪ Print: Annual research report summarizing research progress, advances and publications.</li> </ul>
<p><b>Susan G. Komen for the Cure (Komen)</b></p> <p>Issue to sell: The value of the research they fund and research they support to advance the use of <i>proven</i> new methods, drugs and preventative practices in the interest of saving lives.</p>	<p>Komen commissions and funds research to find improved methods for breast cancer detection, develop new drugs and treatment, and promotes measures to help people reduce their risk of having breast cancer. Since 1982, Komen has invested nearly \$1 billion in its efforts to cure breast cancer and save lives.</p>	<ul style="list-style-type: none"> <li>▪ Build a local Affiliate Network to keep the issue of finding a cure in the public eye.</li> <li>▪ Nurture a trusting relationship with audience as a reliable source of information.</li> <li>▪ Maintain a team of communications specialists to create and distribute materials.</li> <li>▪ Have ready access to the world's leading researchers and clinicians.</li> <li>▪ Track indicators of communications success.</li> <li>▪ Build upon the Komen brand.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Demonstrate success in terms of number of lives saved.</li> <li>▪ Link research to facts: better treatments, improved health practices and reductions in breast cancer occurrence.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Personal contact: National Grassroots affiliates.</li> <li>▪ Personal contact: Champions for the Cure.</li> <li>▪ Internet: Website regarding grants. Research.</li> <li>▪ Print: Localize text when possible (carry messages to the grassroots level) and use real-world examples.</li> <li>▪ Media: Website media center.</li> <li>▪ Brand: Pink Ribbon focus.</li> </ul>

Organization	Context	Strategy	Content	Channels/Style
<p><b>Consultative Group on International Agriculture Resources (CGIAR)</b></p> <p>Issue to sell: The value of high-quality science to ensure sustainable agricultural growth around the world.</p>	<p>CGIAR's research benefits the poor through stronger food security, better human nutrition and health, higher incomes and improved management of natural resources. Without CGIAR's researchers, world production of food would have been 4-5 percent lower in developing countries and more than 13-15 million children would have suffered from hunger and malnutrition.</p>	<ul style="list-style-type: none"> <li>▪ Focus on developing a good relationship with the Media to capture the attention of officials.</li> <li>▪ Use written materials as "leave behinds" with officials to reinforce face-to-face communications.</li> <li>▪ Share communication practices, techniques, and resources to help partners/CGIAR Centers further the impact of research.</li> <li>▪ Maintain close ties with policy makers, elected or appointed officials.</li> <li>▪ Leverage partners in disseminating information.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Give meaning to results – emphasize impact of results in terms of reducing poverty and hunger and protecting the environment.</li> <li>▪ Be clear in what is being communicated and use concrete and compelling messages.</li> <li>▪ CGIAR centers focus on research issues of local interest.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Personal contact: CGIAR liaison with key officials and policy makers.</li> <li>▪ Media: Local radio interviews and public media discussions.</li> <li>▪ Internet: Website in multiple languages and many interactive functions; Research &amp; Impact as a key item; Extensive library and database of publications.</li> <li>▪ Multi-media: Video and PSAs.</li> <li>▪ Print: Newsletters on each research issues.</li> </ul>
<p><b>Association of Fish and Wildlife Agencies (AFWA)</b></p> <p>Issue to sell: The value of conservation and stewardship practices to protect natural resources.</p>	<p>Create a unified voice to ensure that adequate funding and policies are in place for conservation of all species. Expanded and emerging fish and wildlife conservation programs and activities will protect our nation's natural resources.</p>	<ul style="list-style-type: none"> <li>▪ Focus on current issues of most importance to the public.</li> <li>▪ Build partnerships with corporations, federal and state agencies, fish and wildlife organizations and dedicated individuals.</li> <li>▪ Involve the AFWA communication specialist and other staff in communicating research and issues.</li> <li>▪ Facilitate the transfer of reliable and relevant research to where it is needed most.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Link research with the direct benefits derived in terms of improving or protecting fish and wildlife habitat and health.</li> <li>▪ Present time-relevant information.</li> <li>▪ Target information to meet the audience needs and interests.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Personal contact: Science and Research Liaison, particularly for congress and their staff.</li> <li>▪ Personal contact: Partnership programs such as Teaming with Wildlife Coalition</li> <li>▪ Print: Fact Sheets</li> <li>▪ Print: creative, colorful and graphic heavy; brochures, toolkits</li> <li>▪ Internet: Website to advance research and information transfer, Image gallery, Conservation News blog</li> </ul>

The majority of these organizations place an importance on all levels of the communications process with an emphasis on the bottom two layers (Channels and Style). It is important to recognize these organizations typically have substantial resources (e.g., staffing, printing and distribution budgets) dedicated to communications and public relations.

### Communication Channels

As shown in Table 6-2, organizations that are successful in communicating their research do not rely on a single communication channel or approach. Without exception, these organizations deliberately use multiple channels and tools to communicate about and involve audiences in their research.

**Table 6-2: Research Communications Channels Used by Other Organizations**

Channel	St. Jude	Komen	CWRU	CGIAR	FESIP	NASA	AFWA
Champions/Ally Program	●	●	○	◐	○	●	●
Sponsorships/partners	○	●	○	○	●	○	○
Publish in Journals, Trade	●	◐	●	●	●	●	●
Extended Networking	●	●	●	●	◐	◐	●
Advocacy Groups	●	●	●	●	●	●	●
“Work shopping,” Conferences, Meetings	●	●	●	●	●	●	●
Speakers Program	◐	◐	○	○	○	●	●
Website	●	●	●	●	●	●	●
Media Center	●	●	○	◐	○	○	●
Video/PSA	●	●	●	●	○	◐	◐
Radio Interviews/PSA	●	◐	●	●	●	●	●
Print Media	●	●	●	●	●	●	●
Awards for service/contributions	●	●	○	○	○	●	●
Key: Tool use observed during secondary reviews/interviews ●= Primary tool (heavily relied upon) ◐= Secondary tool (occasionally used) ○= Little or no evidence found of use							

Of the many channels cited above, several stand out:

- *Champions/Ally Programs.* Several of the organizations cited above build networks of trusted and reliable advocates, champions, and allies for spreading information and extending their reach to target audiences. Building and establishing credibility and trust is a critical element of audience receptivity to communications about research. Therefore, building networks with individuals and organizations that financially support or use the research results or otherwise benefit from them (e.g., advocates, patients, other researchers) is a critical communication channel.
- Research champions/advocates can be important conduits of information transfer and message delivery. In many cases research advocates/champions can significantly influence decision makers. Several of the organizations not only build these networks, but also frequently include their networks in the communications planning process or provide them

with tools and formalized training and resources to facilitate their communications. This was a distinguishing feature of the organizations in our Task 6 (compared to the Task 5 findings). For instance, Komen provides their Champions for the Cure with tool kits for grassroots communications, as does the W. K. Kellogg Foundation. Both organizations encourage their champions to use these tools so their mutual communications are aligned. This way, the champions' communications are more effective in influencing the audiences they target.

- *Websites.* Organizations have embraced the proliferation of the Internet; it has created a host of opportunities for furthering communications to maximize accessibility and transfer of information and thereby increasing awareness and interest in the organizations' research. Generally, most communication products distributed by the organizations also were available on the organization Website. Highlights of the use of the Internet as a primary channel for communicating research include:
  - Organizations use the Internet heavily to communicate with all audiences, and interviewees attributed a lot of their communication success to the ability of information to be accessed 24 hours a day, seven days a week. Some organizations, such as the Association of Fish & Wildlife Agencies, use the Internet as its primary means of communication with its members and key audiences.
  - Organizations with other group affiliations abundantly share information and provide links and information on each other's Websites. These other organizations generally have similar research goals, or would somehow benefit from the research conducted. The CGIAR offers a good example of information sharing through the Internet. With members located worldwide, the Internet presents a cost-effective and viable information transfer channel.
  - Some Websites go beyond simply providing media releases on the site, and instead, offer a full media center containing fact sheets, appropriate contacts, print media releases, and audio or video clips for broadcast media. Examples of Website media centers are included at the end of this chapter for the Susan G. Komen, St. Jude's, and the National Aeronautic and Space Administration (NASA).

The value of Websites as dissemination venue for communicating research is dependent upon maintaining the site with up-to-date information and technology. Doing so requires an organization's commitment of staff and budget to cover necessary technology enhancements over time.

## Communication Styles

Most of the organizations and many of the resources we reviewed recognize the value of style (e.g., delivering information in formats that are clear, concise and tailored to the audience) in their research communications. Resources contain chapters devoted to providing practical guidance on style, and organizations include style in their communications plans. So, when it comes to communication styles, it is reasonable to assume that there are many similarities between research programs in terms of communications styles. But, often quite different approaches to style are used by many of the organizations in our review than those presented in our Task 5 findings. Two examples follow.

- *Use of Branding.* Many organizations with responsibilities to communicate research set clear guidelines on the style and standard of communications, including the insistence of consistent branding. In fact, many government agencies and major corporations and foundations have strict policies on the dissemination of research products and standards to ensure consistency in style, layout and presentation of research projects.

Our review indicates that the use of a 'brand' or image of the research project or sponsor is a growing practice in communicating research. In these instances, branding goes beyond



including using a particular color scheme in materials and an organization's logo. It can include important graphic images, such as the Komen Foundations "pink ribbon" or the use of iconic symbols such as a photo of or quote by Danny Thomas (St. Jude) on materials. Branding creates an instant connection between the research organization and the audience—bridging the gap between the provider and the receiver. It brings a new layer of credibility and personality to the research product and the institution delivering it. As a result, connecting research with a brand can contribute to the audience's trust in the information they are receiving.

- *Use of Communication Professionals.* Matching the appropriate style with an intended audience, requires a team effort between researchers and communications professionals. Each of the organizations we highlighted in Table 6-1 and most of the organizations in Table 6-2 team their researchers with communications professionals within their organizations. A number of the organizations' communications and public relations experts conduct workshops and distribute guides to improve communication skills of researchers. One outcome of the Best Practices workshop conducted by EPA's Board of Scientific Counselors specifically recommended enhancing the agency's researchers' communication skills capacity by including communication professionals on the research team.

## Target Audiences

The broad audiences most frequently referenced by organizations as targets included decision/policy makers (congress, elected officials, agency heads who affect or drive or enact legislation), stakeholders (members, financial contributors, research sponsors, other researchers or potential users of the research), media and the public. While our research revealed a number of approaches for targeting audiences very similar to those identified in Task 5, those approaches that varied are presented in Table 6-3.

**Table 6-3: Audience-specific Communications**

Audience	Content	Channels	Style
<b>Congressional and Elected Officials and their staffs</b>	<ul style="list-style-type: none"> <li>▪ Be specific about objectives</li> <li>▪ Pretest the content</li> <li>▪ Link the results to important, related events for greater relevancy to audience</li> <li>▪ Explain implications</li> <li>▪ Have a “news hook” or story element</li> <li>▪ Lead with and focus on the conclusions</li> </ul>	<ul style="list-style-type: none"> <li>▪ Panel discussions and “work shopping” to get the facts on the table; Invite the policy and decision makers to serve as Chairs.</li> <li>▪ Personal contact through liaison and offer two-way communications</li> <li>▪ Use media/journalists to inform</li> <li>▪ Networking—work every angle</li> <li>▪ Dialogue</li> </ul>	<ul style="list-style-type: none"> <li>▪ 1-2 pages is best, keep less than 20 pages</li> <li>▪ Use real-life examples</li> <li>▪ Talk to them as you would a family member, not a dissertation advisor</li> <li>▪ Present 2-3 points maximum and use bulleted summaries</li> </ul>
<b>Stakeholders and Decision Makers</b>	<ul style="list-style-type: none"> <li>▪ Tailor to the values of each</li> <li>▪ Inform other researchers how this helps them meet their own goals</li> </ul>	<ul style="list-style-type: none"> <li>▪ Panel discussions and “work shopping”</li> <li>▪ Newsletters</li> <li>▪ Workshops—with cross-stakeholder participation</li> <li>▪ Awards and recognition programs</li> </ul>	<ul style="list-style-type: none"> <li>▪ Bulleted summary of research highlights on Website, but offer link to full technical report or article.</li> </ul>
<b>Media</b>	<ul style="list-style-type: none"> <li>▪ Highlight the breakthroughs</li> <li>▪ Weave in real-life examples</li> <li>▪ Reduce the message into a 30 second sound bite</li> <li>▪ Address risks and benefits</li> </ul>	<ul style="list-style-type: none"> <li>▪ Post press releases to wire services and on Website.</li> <li>▪ Personal contact through liaison</li> <li>▪ Media Centers with stock photos, video clips</li> <li>▪ Actively market news releases to journalists after distribution to sell the story and offer other leads and photo opportunities</li> </ul>	<ul style="list-style-type: none"> <li>▪ Interactive video and Websites</li> <li>▪ Computer animations</li> <li>▪ Video news release formats</li> <li>▪ Ready to run feature articles</li> </ul>
<b>Public</b>	<ul style="list-style-type: none"> <li>▪ Frame within local terms</li> </ul>	<ul style="list-style-type: none"> <li>▪ Website and blogs</li> <li>▪ Events (roadshows) with giveaways, if applicable</li> <li>▪ Media Centers with interactive multimedia presentations</li> <li>▪ Public talk shows (radio)</li> <li>▪ Champion: Use an outside, credible source (scientist, public advocacy program, federal partner)</li> </ul>	<ul style="list-style-type: none"> <li>▪ FAQs</li> <li>▪ Website</li> <li>▪ Interactive videos and Websites</li> <li>▪ 3D animation</li> </ul>

In our review, we noted that some communication products are used for more than one audience, and so the channel for delivering it may differ from audience to audience. For example, an annual report might be mailed to members or donors, while it might be personally delivered to congressional delegates. While some communication products carry the same message, they are always written with the technical level of the audience in mind. For example, an article on research accomplishments would use layman's terms and focus on results for a media release, while the same research accomplishments are published in member publications using more scientific language and content.

## **Best Practices Interview Summaries**

### **Susan G. Komen for the Cure**

#### **Context**

Komen for the Cure is the world's largest grassroots network of breast cancer survivors and activists working to save lives, empower people, ensure quality care for all and energize science to find the cures. Since 1982, Komen for the Cure has invested nearly \$1 billion in efforts to fulfill its promises, making it the largest source of nonprofit funds dedicated to the fight against breast cancer in the world.

Local Affiliates, comprised of volunteers, form the backbone of the organization. A headquarters office serves as the primary link between all affiliates and Komen's partners.

Komen partners with other organizations that are seeking breakthroughs in cancer diagnosis and treatment, such as the American Society of Clinical Oncologists and the American Association of Cancer Research.

Komen commissions research, and also helps to fund research conducted by other organizations. Research involves finding improved methods for breast cancer detection, developing new drugs and treatment options, and identifying measures people can take to reduce their risk of having breast cancer.

#### **Facts**

##### ***Actors and Audiences***

The most critical key actors in Komen communications are the more than 100,000 volunteers that make up the local Affiliate Network. These volunteers keep the issue of finding a cure for breast cancer in the public eye. Some volunteers are involved in Komen's Champion for the Cure, which is a subunit of Komen that works to educate elected officials and Congress about breast cancer research and issues.

The general public, breast cancer survivors, patients, physicians, policy makers and donors are the key audiences to whom most Komen communications are directed.

##### ***Communication Approaches***

Komen relies on its grassroots advocacy network to disseminate information to all audiences with whom they communicate. This is particularly true for communications with media, the public, and policy makers or a local affiliate level. The headquarters office of Komen for the Cure employs communication specialists who create materials and make them available to local affiliates.

The headquarters office also generates some communications from a national perspective.

##### ***Communication Messages***

The single, most important message the Komen for the Cure organization works to broadcast about the research they fund or the research they support is that it saves lives. The goal of the organization

is to cure breast cancer, which means they are working to reduce to zero (0), the number of women who die from breast cancer.

## Challenges

Komen reports the most daunting challenge they have faced with communicating about research and its value is that “a lot of people, including many members of the press, see the word ‘research’ and either think they can’t/won’t understand it or they are afraid to even try. Coupled with this is the fact that Komen funds a lot of ‘basic’ research – inquiries at the cellular level, etc. and it is, at times, difficult to follow and even more difficult to visualize how the research is eventually going to benefit the patient.”

To address this challenge, Komen offers consumer-friendly breast health and breast cancer information congruent with eighth- to tenth-grade reading levels. The organization produce reader-friendly research/researcher profile stories for use in newsletters and on Komen’s Web site.

Another challenge Komen has faced with communicating about research and its value is the organization’s responsibility to not promote scientific advances that, however promising they might sound to patients, are not yet proven and therefore not yet ready for prime time.

“Many reporters and editors, in their zeal to run with a story and to perhaps offer hope and encouragement to their readers, want to publicize advancements before it really makes sense to do so,” reports Komen’s senior communication staff. “Our job, at times, is to put on the brakes and to offer context and perspective about the process involved in bringing scientific advancements from the laboratory bench to the patient bedside. It’s not as quick as some people would believe it to be!”

Komen has worked over the years to make sure that reporters and editors know that when they come to Komen, they will get reliable information and access to some of the world’s leading breast cancer researchers and clinicians if they want to go in depth on a particular subject or they need more context.

Komen also added a chief scientific advisor, Dr. Eric P. Winer, an internationally known oncologist and educator from Harvard, to head their Scientific Advisory Board, comprised of leading breast cancer researchers and clinicians. This board offers expert comment and perspective on breaking news in the breast cancer arena. Dr. Winer and the Board make sure Komen issues news and updates on research are reliable and evidence-based.

## Outcomes

Komen has several measures for determining the success of their communications, including communications about research and its value. Those include:

The numbers and types of media calls they receive. In the last several years, the questions and issues reporters brought to the organization have become more in-depth and sophisticated. Komen feels this demonstrates they have made considerable inroads on reaching members of the media with context and background information on the complexities of breast cancer.

The number of ‘hits’ Komen receives on a particular story on its Web site regarding grants and the research, the number of inquiries they receive about their research efforts, and the number and caliber of grant applications it receives – all of which are on the increase – also are indicators of communication success regarding research. Donations to Komen for the Cure continue to increase and the participation in the Komen events, such as the Race for the Cure, continues to be robust, as well. Funding from partner programs is expected to rise by nearly 40 percent this year.

## **Association of Fish & Wildlife Agencies (AFWA)**

### **Context**

The Association of Fish & Wildlife Agencies (AFWA) promotes sound management and conservation, and speaks with a unified voice on important fish and wildlife issues. The association represents all of North America's fish and wildlife agencies, including the fish and wildlife agencies for all 50 United States.

Several federal agencies partner with the AFWA in its efforts to promote sound management and conservation, including the U.S. Geological Survey, U.S. Fish & Wildlife Service, National Park Service, Bureau of Land Management and the U.S. Department of Agriculture.

AFWA has a Science and Research Program, which is designed to strengthen cooperation between state, federal, private and international agencies and partners. The Science and Research Program seeks to expand and enhance scientific capabilities and services by matching state research needs with the science capabilities of federal agencies. A Science and Research Liaison works closely with a variety of partners to initiate and provide timely, credible, science based information that can be used by resource managers to protect and manage fish, wildlife, and their habitats in the public interest.

Science and research topics are defined based on wildlife, fisheries, and aquatic research areas identified by the states, and then developed into initiatives and programs that have benefits relevant to resource managers.

Current issues involved in AFWA research include wind power impacts on fish and wildlife, global climate change and hurricane restoration and recovery.

### **Facts**

#### ***Actors and Audiences***

The AFWA's members, and the leaders of those organizations (state fish & wildlife agency executives), are key actors in the activities and communications of the organization. The AFWA also had a small staff, which includes a communication specialist, and a legislative director.

The AFWA considers its members (including the resource managers who work for the member organizations) to be its primary audience. The U.S. Congress, sportsman's organizations, conservation groups and the general public are also considered to be key audiences.

#### ***Communication Approaches***

Targeting communication materials and messages to specific audiences is common practice for the AFWA. The association creates several materials that are similar (such as newsletters, information kits and fact sheets, but distributes the materials using different methods, depending on the audience.

The AFWA believes in being creative with communications, particularly to bring attention to specific elements of fish and wildlife successes. An example of this is the awards they bestow upon congressional representatives, members or individuals.

Building relationships with key decision makers, such as congressional officials, is considered critical to the AFWA. Regular, personal contact helps create a presence for the association, and has helped AFWA build a reputation among those officials. Developing relationships with congressional staff is considered as important as developing relationships with congressional officials.

A network of communicators within the association's members and partners, and groups or organizations interested in fish and wildlife issues serves as a means to disseminate information

And, finding champions who will advocate for the association, its mission, and its research efforts is a part of the AFWA's communication strategy.

### ***Communication Messages***

The AFWA's research efforts are one element of the association's communications. However, messages about research are focused on the benefits derived from that research. This includes the positive impacts research has on fish and wildlife habitat and health.

### **Challenges**

Information overload on the part of communication recipients is considered one of the challenges to communications of the AFWA. Another challenge is ensuring recipients understand the information given to them, particularly when it involves complex, technical information. This is particularly true for information distributed to congressional officials and staff.

The AFWA attempts to balance the amount of information they provide, with the need to create more awareness or knowledge of their activities. The association focuses its communication efforts on issues of current interest, which is largely defined as those issues deemed most critical by the public.

To ensure there are no misunderstandings or miscommunications about the information they distribute to congressional and elected officials, the AFWA feels it is imperative to have someone discuss the information with the official's staff beforehand.

### **Outcomes**

A key target audience of AFWA is Congress, with the goals of increasing stable, long-term funding through federal legislation and seeking annual congressional appropriations to help finance fish and wildlife conservation programs. In 2000, AFWA efforts included passing of the Wildlife Conservation Restoration and State Wildlife Grants Programs. In April 2006, when a massive cut threatened the State Wildlife Grants Program, the association lead an intensive 5-week campaign of grassroots, leadership and media to help restore Program funding in the Senate.

## **Consultative Group on International Agriculture Resources (CGIAR)**

### **Context**

The Consultative Group on International Agricultural Research (CGIAR) is a strategic partnership of countries, international and regional organizations and private foundations supporting the work of 15 international centers. In collaboration with national agricultural research systems, civil society and the private sector, the CGIAR fosters sustainable agricultural growth through high-quality science aimed at benefiting the poor through stronger food security, better human nutrition and health, higher incomes and improved management of natural resources.

According to CGIAR's Website, the organizations research agenda is "dynamic, flexible, and responsive to emerging development challenges." Originally focused on increasing crop production for specific critical food crops, CGIAR's research today incorporates biodiversity and environment research.

### **Facts**

#### ***Actors and Audiences***

Key actors in research and communications efforts of CGIAR are its member organizations, the leaders of those organizations, and a CGIAR staff based in Washington, D.C.

Key audiences include international aid agencies, policy makers (i.e., U.S. Congress and leaders of developing nations), private organizations and foundations, natural resource organizations, and the media (including international media).

#### ***Communication Approaches***

CGIAR uses both a centralized system of communications, and local communications at their 15 centers. The centralized system's foundation is the Internet—to keep members, the media and mainstream interests informed.

A more personalized approach is taken to policy makers and elected or appointed officials. The CGIAR staff director and various staff members of CGIAR have direct access to key officials, and make most contacts. The director and staff maintain close ties with key policy makers.

CGIAR also leverages its members' and partners' communication abilities to disseminate information. For example, local CGIAR centers participate in radio interviews and local media discussions, or a partner organization may produce a video that incorporates video from CGIAR, or research results from CGIAR can be found on links of Websites of CGIAR partners.

#### ***Communication Messages***

CGIAR believes communicating the value of the research conducted must include concrete, compelling messages that emphasize the impacts of research conducted. The results of the research must be clear, and communications must link the results to CGIAR's goals of reducing poverty and hunger, and protecting the environment.



## **Challenges**

The CGIAR generates a lot of information, and recipients often can feel bombarded. This is particularly true for policy maker audiences. The CGIAR judiciously uses personal contacts with policy makers and officials to address this aspect of those communications.

Another challenge cited by CGIAR is that written communications often go unread, no matter how they are distributed. To address this challenge, the CGIAR has put more focus on media coverage—and finding ways to tell stories that reinforce the messages they wish to convey. “Decision makers may not read a brochure that we give them, but they do read the Economist, Wall Street Journal, Washington Post or other major newspapers ... and they watch CNN and CNBC, and other television news.” Written communications also now serve more as a way to reinforce face-to-face communications between CGIAR staff and their key audiences.

## **Outcomes**

The CGIAR measures its success at communicating the value of research through increases in donors and donations to its programs. The organization considers its communications to have been “moderately” successful over the past six years, as they have been able to garner new support, and maintain existing support in a “competitive environment.”

The amount of media coverage CGIAR has experience is increasing, which is another measure the organization uses to measure its outreach success.

## **St. Jude Children's Research Hospital**

### **Context**

The mission of St. Jude Children's Research Hospital is to advance cures, and means of prevention, for pediatric catastrophic diseases through research and treatment. No child is denied treatment based on race, religion or a family's ability to pay.

St. Jude welcomes treating physician referrals of children and adolescents with newly diagnosed untreated or suspected cancer; HIV infections; or certain hematologic, immunologic, or genetic diseases. Since the hospital is a research center, every child accepted is enrolled in a specific study or "protocol." Information gathered from these studies is used in developing better treatments.

Research efforts are directed at understanding the molecular, genetic and chemical bases of catastrophic diseases in children, identifying cures for such diseases and promoting their prevention. Research is focused specifically on cancers, acquired and inherited immunodeficiencies, infectious diseases and genetic disorders.

The current basic and clinical research at St. Jude includes work in gene therapy, bone marrow transplant, chemotherapy, the biochemistry of normal and cancerous cells, radiation treatment, blood diseases, resistance to therapy, viruses, hereditary diseases, influenza, pediatric AIDS and psychological effects of catastrophic diseases.

Founded by the late Danny Thomas, a prominent actor and musician, St. Jude is a private institution funded by donations. The American Lebanese Syrian Associated Charities (ALSAC) is the fundraising arm of the St. Jude organization. ALSAC, which was established five years before St. Jude opened, is now the third-largest health care charity in the world.

### **Facts**

#### ***Actors and Audiences***

Leaders of St. Jude and ALSAC are crucial players in communicating about the research conducted at St. Jude. The hospital and ALSAC also have staff dedicated to communicating within different areas of the organization. (St. Jude has a specialist for handling each of media, fundraising and physician referral communications.

Key audiences include patients, their parents, physicians, donors, and the general public.

St. Jude is a private, nonprofit organization. It has no political or governmental ties.

#### ***Communication Approaches***

Communications at St. Jude are centralized, but compartmentalized. All communications initiate from St. Jude's main campus in Memphis, Tennessee. However, the hospital, fundraising arm, and physician referral units all have their own communication specialists, who generate communications for their own unit. However, each communication unit incorporates information to demonstrate the value of St. Jude research in nearly every communication product created.

### ***Communication Messages***

The value of research is communicated in terms of lives saved, the number of new and improved treatments,

### **Challenges And Outcomes**

Information about challenges and outcomes was unavailable from St. Jude.

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- Centers for Disease Control
- National Institute of Health
- Environmental Protection Agency
- World Health Organization
- Oregon State Board of Higher Education
- Federal Geographic Data Committee (USGS)

#### ***Advocacy Organizations***

- St. Jude Children's Research Hospital
- Susan G. Komen for the Cure
- Robert Wood Johnson Foundation
- W.K. Kellogg Foundation
- Richard Roundtree Foundation

#### ***Research and Social Policy Organizations***

- Case Western Reserve University
- Consultative Group on International Agriculture Resources
- Federation of Earth Science Information Partners
- National Science Foundation
- Population Reference Bureau
- Canada Centre for Urban Health Initiatives

#### ***Trade Associations***

- Association of Fish and Wildlife Agencies
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## CONCLUDING OBSERVATIONS

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### Communication Matters

The importance of communicating research transcends the transportation field to other disciplines including health, environment, agriculture, education, and other social issues. Secondary research revealed a wide variety of organizations within these fields are involved in communicating the value of research. They include Government agencies, private foundations, Universities and research centers, research and high-tech companies (pharmaceuticals, nanotechnology, biotechnology, etc.) throughout the world.

These organizations, particularly the ones highlighted in this review, share a strong belief that *communication matters*. They recognize that without the communication of research to the appropriate audience, support for future funding could be jeopardized, research may not be put into practice, and the public would not benefit from its potential impacts. At the Global Forum for Health Research in Mumbai in 2005, a participant from Kenya summarized, “Health research is only useful if put into action. Getting research put into action means communicating it effectively at all levels.”

### Communications Is Part of the Research Process – Not an Add-on

The secondary research effort resulted in the review of about twenty organizational Websites, and a number of relevant articles, publications, and other resources related to the topic of communicating research generated by these and other organizations. Nearly all of the organizations we reviewed followed a communications process very similar to the generic process outlined in this Task 5.

Consistent with the shared conviction that communication matters, a common concern across the organizations and materials we reviewed was the need to effectively link researchers and research results with their intended audience(s) by strengthening communications throughout the research process. In fact, they stressed that communication needs to be part of the research process, not just an add-on when the research has concluded.

Communicating research includes more than disseminating research findings. Communications should link research to the target audience(s) during the design and conduct of the research to capture, involve, and retain their target audience(s). Doing this brings together a network of researchers, decision makers, and other stakeholders into the research process and subsequently builds relationships that last beyond a particular research project. Recognizing that building these relationships is not always easy, several strategies for doing this stood out:

- Obtain early input and involvement of the decision-and policy-makers and intended users or beneficiaries of the research target audience early in the process—through proper framing of the research to the political or institutional context. Make research matter by focusing on the social and political context and make it relevant to the audience.
- Build networks of research or issue advocates, allies, or champions (referred to as connectors, mavens and salesman by Malcolm Gladwell in *The Tipping Point*) to help circulate ideas and information and gain access to your audience.
- Cultivate encounters with target audience(s) or others struggling with issues related to the research topic—making the encounters happen routinely rather than by chance or in a hostile environment.

Carrying out these strategies requires upfront communications planning at the onset of the research process and carrying out the plan throughout the research effort.

## **Taking Communications Seriously Means Building Skills and Considering Communications Professionals**

The importance of *effective* communications throughout the research process was another theme unanimously emphasized during the secondary research review. Two aspects of communication were highlighted—one is appropriate dissemination of results and the other is paying attention to the ongoing communication and dialogue throughout a research effort. Examples of doing this effectively include: distillation of research findings to the appropriate technical level of the audience, the use of plain and clear language rather than academic style, using a range of formats tailored to different audiences, using multiple channels to reach different audiences, and paying attention to timing.

Enhancing the communication skills of researchers is clearly a priority of many organizations with a need to communicate the value of their research. However, building communication skills needs to be balanced with the danger of asking researchers to be all things to all people. Many of the organizations we reviewed drew on the support of intermediaries such as communications and public affairs professionals, graphic designers, and technical editors, to assist with communicating with different audiences. Taking research communications seriously means building the communications skills of researchers but also providing resources to support and enhance the communication capacity at the onset and throughout a research effort.

### **Guidebook**

“Communications Matters: Communicating the Value of Transportation Research,” an NCRHP publication, is the culmination of this research project. The information in the guidebook will show transportation researchers how adopting a principle of continual communications throughout the research process can increase the likelihood of the research project accomplishing its desired goals. The guidebook is the companion document to this report.