

# FEDERAL HIGHWAY ADMINISTRATION'S INTERNATIONAL TECHNOLOGY TRANSFER PROGRAM

by

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## ABSTRACT

*Transportation professionals and organizations (public and private) worldwide need information and knowledge that will enable them to advance their processes, incorporate innovative products into existing programs, improve cost efficiency, and increase technical know-how that results in positive change and impact on transportation systems. A huge universe of institutional and technical knowledge exists and continues to be developed that can be tapped to fulfill varying information and resource requirements. As budgets continue to be inadequate for meeting all of the demands, it becomes incumbent upon transportation officials and engineers to gain from the developments of others around the world, rather than “re-inventing the wheel” or making the same mistakes that others have made.*

*A technology transfer program that systematically and actively facilitates the acquisition and dissemination of technology, practice and policy knowledge, and know-how from around the world would be beneficial. The focus of this paper is on the Federal Highway Administration's International Technology Transfer Program. It addresses technology transfer as it exists today in the United States, Latin America and the Caribbean, central Europe, Southern Africa Development Community (SADC), and South Korea; FHWA's support in establishing Technology Transfer (T<sup>2</sup>) centers and the development of a global technology transfer network.*

## 1.0 INTRODUCTION

The Transportation Network is an essential part of the economic development of any nation. The costs to construct and maintain the network are significant, and in many cases around the world, the available funding to meet those needs is inadequate. Therefore, information on better or more efficient policies, practices, or technologies which could be implemented and result in a more cost-effective use of resources, would be beneficial.

In creating its transportation system, the United States drew, and continues to draw, on the experiences of other countries and combine these with its own plans, policies, and techniques. We imported our early construction techniques from Europe. Until the 1820's, many roads were constructed using techniques developed in France during the

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18th century. In more recent times, Germany's autobahns inspired the design of the Interstate System after World War II.

Today, realizing the benefit of learning from the experiences of others, the United States continuously scans the globe for advanced technologies, research, and best practices to apply to today's challenges of building/maintaining roads, and transportation systems, to serve the American public and industry. New ways of doing business, organizational and public management and innovative financing are all part of the mix of modern global demands, along with pavements materials, safety, environment, geotechnical, bridges, Geographic Information System, intelligent transportation systems (ITS) and other technical topics that generally dominate the attention of road transportation organizations and professionals. Because the challenges of building, maintaining and managing our transportation systems are constantly in dynamic flux, it is axiomatic that we have to continuously develop, learn and apply new knowledge. This has always been, and continues to be, the Federal Highway Administration's approach to serving our customers and partners in the United States and globally.

While the United States has vast resources to commit to research and development, those resources are not unlimited and the challenges seem to be infinite. For every problem addressed, others are created, or occur. Yet, by systematically prioritizing needs, a great deal of applied research is developed through a complex layer of cooperative relationships. Our research partners include Federal, State, private and academic collaborations in the United States, as well as international technology exchange with other nations, particularly in Europe, Australia and Japan.

However, developing innovations and acquiring knowledge is only one half of the equation. As practitioners, we are all acutely attuned to the challenges of effective technology transfer and implementation. The transportation needs of our communities vary among countries and even within our country. Some are highly developed while others are still developing. Some are focusing on high tech ITS while others are looking to have dependable telephone and internet service. However, no matter what level of development one is at, the resource, technical and psychological impediments to effecting change are not unique to any one part of the world. The focus of this paper is on the Federal Highway Administration's international technology transfer program.

FHWA is actively expanding its participation in the improvement of the Sub-Saharan Africa's access to information related to highway, road, and street technology. We believe that a network of transportation-related Technology Transfer Centers can contribute to creating the conditions for sustainable development, thereby facilitating foreign direct investment and enhancing the flow of international trade with and within Sub-Saharan Africa.

The objective of this FHWA initiative is to cooperate and assist in the establishment of several technology transfer centers in Sub-Saharan Africa. These centers will focus on improving access to information on institutional issues and program building, the best transportation technology and practices, training and linking our private sectors. FHWA

is undertaking this initiative in cooperation with the Republic of South Africa's Department of Transport, the World Bank's Road Management Initiative, the World Road Congress (PIARC), the International Road Federation, U.S. State highway agencies, the U.S. private sector, and others. Most significantly, it is designed to build on existing national and international programs that promote appropriate transportation technology transfer.

As cooperative exchange and assistance activities are undertaken with Sub-Saharan Africa the intent is to provide better access to U.S. technology and practices. One purpose of undertaking this program is to improve African private sector ties to the U.S. private sector, including industry associations, and private sector ties within the continent. To this end, FHWA, in cooperation with the World Bank, conducted a contractor development mission in June 2000 that addressed the climate of the local contractors industry in Tanzania<sup>(1)</sup>. This resulted in the identification of needs, recommendations to address these needs as well as the signing of a Memorandum of Understanding (MOU) between the Tanzania Civil Engineering Contractors Association (TACECA) and the National Association of Minority Contractors – Wisconsin chapter. Also, on this mission, there was a signing of an MOU between TACECA and the Women Engineers and Quantity Surveyors and Architect Association.

In July 2000, the FHWA, conducted a U.S. Agency for International Development, Regional Center for Southern Africa (USAID-RCSA) funded study on the "Establishment of a Regional Association of National Roads Agencies and Regional T<sup>2</sup> Center."<sup>(2)</sup> This study addressed the urgent need to establish a regional institutional framework and mechanisms for enhancing regional policy coordination and road transport systems integration in order to improve intra-regional road transport efficiency and lower road transport costs. FHWA was assisted by InfraAfrica Consultants (a Botswana based firm of regional consultants), a representative from the American Association of State Highway and Transportation Officials (AASHTO), two SADC country representatives plus a representative from the Southern Africa Transport and Communications Commission Transportation Unit.

## **2.0 TECHNOLOGY TRANSFER**

Transportation professionals and organizations (public and private) worldwide, need information and knowledge that will enable them to advance their processes, incorporate better new products into existing programs, improve cost efficiency, and increase technical know-how that results in positive change and impact on transportation systems. A huge universe of institutional and technical knowledge exists and continues to be developed that can be tapped to fulfill varying information and resource requirements. As budgets continue to be inadequate for meeting all the demands, it becomes incumbent upon transportation officials and engineers to gain from the developments of others around the world, rather than "re-inventing the wheel" or making the same mistakes that others have made. FHWA's International Technology Scanning Program is a major vehicle for accessing foreign innovations. This program, undertaken cooperatively with

the American Association of State Highway and Transportation Officials (AASHTO) and its Select Committee on International Activities, and the Transportation Research Board's National Cooperative Highway Research Program, the private sector and academia has resulted in significant improvements and savings in U.S. transportation technologies and practices.

This process of openly gaining and freely sharing experiences, solutions, technologies, and innovations has come to be understood as “technology transfer.” Technology Transfer describes both a mission and a process. The *technology* – the what – entails the materials, products, and processes developed through research and innovations to improve transportation systems. This can include both technology, as well as institutional issues.

Technology transfer can occur in many ways and different forms. At its simplest form, technology transfer happens when someone reads about a “new” technique in a report or a technical magazine. It also occurs when a university professor in one country learns about and teaches an innovative design method from another country. Still another way can be when a new product, procedure, process or material is included in a transportation project by a contractor or consultant from another continent or industry. Regardless of the form, ultimately technology transfer is aimed at using the benefits of someone else's successful research, development or experience to their benefit locally – often at a fraction of the original development cost. Technology transfer in the transportation sector, as in any field, can be a catalyst for long-term change and improvements.

A technology transfer program that systematically and actively facilitates the acquisition and dissemination of technology, practice and policy knowledge and know-how from around the world would be beneficial.

Such a program can be general in handling all transportation topics, and adapting techniques to local conditions or they can be specialized if desirable or necessary. Acquisition of up-to-date knowledge of the practices of others pertaining to technology, management, and even institutional issues can help practitioners address some of their most fundamental issues, particularly the skills to develop and deliver improved transportation products and programs. Training is an important element as a technology transfer program moves ahead, in executing the sharing of information with large groups of practitioners from around the world.

### **3.0 THE LOCAL TECHNICAL ASSISTANCE PROGRAM IN THE U.S.A**

As an example of an effective transportation technology transfer network operation through technology transfer centers, the Local Technical Assistance Program (LTAP) is highlighted. In the U.S., resource imbalances that favored major urban areas and interstate highway systems came at the expense of rural areas and smaller municipalities. Dissemination of information, technologies and best practices was uneven until the early 1980's when the FHWA, with the States' Department of Transportation created what was

originally called the Rural Technical Assistance Program (RTAP). Under the Intermodal Surface Transportation Efficiency Act of 1991, RTAP became LTAP reflecting its broader mission. The FHWA, the lead agency in implementing this program, provides matching funds on a 50/50 basis, and assists the centers by producing training videos, manuals, publications, and training materials for the conduct of their training programs.

LTAP serves as the primary channel through which innovative transportation technology is prepared and delivered to both urban and rural local communities in the U.S. and to American Indian tribal governments. There are 57 technology transfer (T<sup>2</sup>) centers – one in each State, one in Puerto Rico and six for American Indian tribal governments – to provide training and technical assistance to local governments. LTAP activities support the operation of the T<sup>2</sup> Centers. They identify, develop, and implement national products including Strategic Highway Research Program products for local communities. They provide information to transportation practitioners who were not otherwise receiving this information.

#### **4.0 TECHNOLOGY TRANSFER CENTERS**

LTAP is one example of a technology transfer network. This model for technology transfer proved so successful that FHWA have begun to export it. In 1987, we began working with the Pan American Institute of Highways to establish T<sup>2</sup> centers in Latin America and the Caribbean. Today there are 87 centers in 21 countries in Latin America and the Caribbean, forming active national and regional training networks. In the early 1990's FHWA supported the establishment of T<sup>2</sup> centers in the Baltic countries, Finland, Russia and most recently in South Korea.

FHWA is actively expanding its participation in the improvement of Sub-Saharan Africa's access to transportation technology and information. It is believed that a network of transportation-related T<sup>2</sup> centers can contribute to creating conditions for sustainable development facilitating foreign direct investment and enhancing the flow of international trade with and within Sub-Saharan Africa. This approach to technology transfer holds potential and promise in Sub-Saharan Africa, and in-fact, it has already begun with the FHWA assisting in the establishment of centers in South Africa, Tanzania, Zimbabwe, Malawi, the South Africa Province of Kwa-Zulu Natal, Botswana, Zambia and soon to be realized, Namibia.

A T<sup>2</sup> center can be a local, national, regional, or international conduit for advancing information with regard to best practices or policies between technology and policy developers, and users. The center focuses on the acquisition and dissemination of information that meet the needs of the transportation community. The achievements of the center is founded on the awareness that productive technology transfer relies as much on understanding the local state-of-the-practice, as it does on the array of available state-of-the-art technology from elsewhere. Although organizational structures and methods of T<sup>2</sup> centers may vary, depending on local conditions, effective centers generally share some basic operating characteristics that allow them to successfully perform their

functions. The focus of each center will vary depending on the needs of the country. For example, the focus of the technology transfer program in a developing country may be the development of the local contractor industry or maintenance techniques for low volume roads; in a country in transition, the focus may be road safety or bridge management; or in a technically advanced country, it could be all of these plus high-level technology and practices such as managing the transportation system through ITS concepts.

To have the center be most successful, the universe from which they receive information on technology, practices and experiences should be as wide as possible. Transportation practitioners can benefit from sharing information with colleagues globally. All those involved in the sharing of transportation-related technical information, as well as other information related to practices, financing and safety should move ahead to promote, produce and strengthen technology exchange worldwide. The FHWA's vision is to have a worldwide network of transportation T<sup>2</sup> centers addressing innovative technologies and best practices.

#### **4.1 Twinning**

The T<sup>2</sup> centers in Sub-Saharan Africa will be linked to the LTAP network in the U.S. as well as to other institutions. In addition, the countries will be twinned with U.S. States (such as Tanzania with Alabama, and Zimbabwe with Nevada,) private sector associations, and companies to facilitate direct technology transfer. Twinning arrangements afford the Sub-Saharan African nations easier access to individuals in the U.S. with whom they are able to establish relationships so that they gain a solid understanding of the U.S. transportation program and how elements of it can be adapted to their needs. Twinning arrangements are set up based on the interest of the respective entities to establish such a relationship, geographic and climatic similarities, as well as institutional need and transportation department capabilities. The value of twinning arrangements cannot be overstated as an integral way to facilitate technology transfer. While free to the T<sup>2</sup> centers, the experience and expertise gained from these collaborations cannot be valued in any currency.

### **5.0 MEASURE PERFORMANCES AND SUCCESS**

The technology transfer process promotes continuous improvement. Ultimately, the true measure of success must be based on the application of the technology to solve real world problems, and this should be the primary consideration from the start of the entire process. By the same token, a technology transfer center or activity needs to include objective mechanisms for measuring progress, performance, and plan for improvement. Therefore FHWA encourages each center to regularly establish, measure, interpret and base future activities on performance criteria and input from stakeholders and partners. This is crucial for maintaining/ensuring continued funding of the center's operations.

Performance measures need to be tied to all activities of the center. These measures need to show results, this is important so that the stakeholder see progress and benefit.

Performance measures are also important for employees so that they can clearly understand the objective of what they are doing and thereby measure the results. As institutional change takes place and program building is addressed, a measure of success of these activities is essential. For example, the technical performance measure resulting from the development and presentation of a safety-related training pertaining to roads is not how many students were trained. The measure would be the number of accidents reduced or the change in the severity of the accidents. This is essential as a technology transfer program continues or the highway program continues to receive funding.

## **6.0 CONCLUSION**

In an age of world markets and global economy, nations can no longer stand alone and hope to advance. Similarly, transport technology is abundantly available all over the world. Where existing associations and forums exist for practitioners to meet and exchange experiences, technology transfer may already be occurring to improve practices and reduce costs. Where such meetings are infrequent, or where it needs to be enhanced and energized, technology transfer centers are a proven mechanism that is locally driven, and locally managed. It must be emphasized that the centers are not FHWA centers. These centers, established with modest start-up assistance from FHWA are expected to demonstrate self-sustainability and must address/meet the needs of individual countries, initially and the region eventually. A T<sup>2</sup> center network can grow into an effective mechanism for information and resource sharing.

A worldwide network of T<sup>2</sup> centers, tied to centers and networks that already exist would be beneficial. It is envisioned that such a network could be subdivided into geographic regions. A possible division into regions could result in having an Americas Region that would include North, South and Central America, a western European Region, a central and eastern European Regions, as well as a Sub-Saharan Africa Region and a North Africa Region.

FHWA acknowledges and encourages the continued support of the USAID-RCSA, PIARC, IRF, and all the national and international customers/partners that support the efforts that promote technology transfer globally.

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