

Proven New Technology Transfer Initiatives Hasten Research Implementation

by

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Abstract

Technology transfer is an essential element of those research projects that can be implemented. Technology transfer is most cost-effective when early implementation of the research product occurs. An expeditious return on the research investment is very cost effective.

With population increases and rapid changes in the society, there is a high demand for new technology. Technology transfer must move beyond traditional methodology if it expects to keep pace, particularly where implementation is concerned.

This paper will present new initiatives in the technology transfer process and will:

- ? examine the traditional technology transfer methodology;
- ? identify and distinguish the practical differences in the multi-tiered technology transfer marketplace;
- ? identify the implementation obstructions faced by individual markets;
- ? outline the new initiatives developed to overcome these obstructions;
- ? demonstrate how success of these new initiatives can be easily measured; and,
- ? use actual case studies to demonstrate how practical obstructions to implementation were overcome in four major research areas: pavement management; unpaved roads; pedestrian safety; and urban congestion mitigation.

Just two of these unique case studies [pavement management and unpaved roads] have, in less than two years, generated in excess of \$24 million dollars of new technology at the local agency level in the State of Florida alone.

Background

The objective of this paper is to present technology transfer techniques for moving research results more efficiently from state-of-the-art to state-of-the practice. Research sponsors, whether in public or private arenas, have long sought to receive a more efficient return on investment. Of no less importance to the end user are the substantial cost savings stakeholders can realize by hastening the discontinuation of outdated, less effective processes, products or services.

During the 1980's the Federal Highway Administration (FHWA) introduced the Local Technical Assistance Program (LTAP) to provide this type of information exchange in support of local road and bridge agencies. Today, LTAP includes 57 Centers across the USA; there is a Center in every state, one in Puerto Rico and six Native American Centers. LTAP quickly proved to be an effective mechanism for delivering training, reference materials and related support services to local agencies. The LTAP initiative has been extremely successful in raising professional awareness of new technology in relying on the tried and true workshop format. Somewhat less effective has been technology transfer's effort in encouraging implementation of new products, processes or services or the discontinuation of inefficient ones.

Technology transfer professionals understand that results of major public or privately-funded research follow a well established path to state departments of transportation (State DOTs) and major metropolitan agencies. Federal, state, and "metroplex" agencies generally have funding, personnel, interactive capacity, and time to stay abreast of or refine new technologies for their use. At the local agency level, a substantial and relatively untapped market, technology buy-in can take up to 30 years. The challenge is to determine what strategies would reduce the timeline for this vast market to move new technology from "state-of-the-art" to "state-of-the-practice."

In developing new technology transfer strategies, a number of essential elements must be first understood and then accommodated if we expect a new initiative to succeed. The elements are:

1. *No new strategy shall exclude or diminish the role of any current participant.*

All entities, whether industry, local or state highway agency, U.S. DOT, professional or trade association must be given an opportunity to realize reasonable benefit according to their various interests.

2. *Industry's role in any new initiative must be increased.*

With direct industry involvement, the period required to move a technology from the experimental stage to state-of-the-practice is greatly increased.

3. *In general, the local agency has the revenue base to implement technology.*

LTAP has proven the perception that municipalities do not have the revenue to keep pace with new processes or products is not true. What this market does not have is money to risk on unproven technology nor do they have the time, staff, or funds to fine-tune a technology.

4. *Political and professional risk must be substantially reduced or eliminated.*

New information delivery strategies must remove or substantially reduce the political and professional risk involved in committing to new technology where little or no practical/local field experience has taken place.

Approach

In developing strategies to improve the effectiveness of technology transfer, it became evident that the role of industry in the technology transfer effort must become more visible. The Transportation Industrial Alliance (TIA) was created to coordinate the public and private research implementation effort. Under TIA, a number of new technology transfer enhancements were developed and are available but, this report focuses specifically on the TIA Product Demonstration Program (PDP). This unique strategy in itself has proven remarkably successful in accomplishing implementation goals.

The PDP information delivery format unites a user agency and vendor in a TIA hosted hands-on demonstration case study. Each PDP case study details how and why implementation was undertaken, agency satisfaction to date, a cost/benefit analysis and includes an actual real time demonstration. To qualify for a PDP, a product or service (technology) must meet four guidelines. First, the product or service (technology) must address a common professional problem. The product, process or service must be in current use and nominated by the user agency. Second, the product or service (technology) must hold promise for a substantial improvement over the currently accepted practice. Third, the vendor/contractor must conduct a real time demonstration of the product/service (technology) in actual use by the user agency. Fourth, the user agency must actively participate in the case study and have personnel available to discuss all aspects of the project. While PDP recognizes there is no "one size fits all" solution to every problem, the goal is to provide enough practical and useful information for an unbiased, professional evaluation of the technology. The PDP format was suggested and endorsed by city and county engineers as the most effective method for providing professionals and elected officials with the information balance needed for a practical evaluation.

Following is a synopsis of each TIA-sponsored PDP conducted to date. These feature pavement management, unpaved roads, pedestrian safety and urban congestion mitigation. It is important to note that this delivery format is not only effective when research produces a product or service, but it is equally effective for research producing new or updated planning and design strategies.

Pavement Management ? Coral Springs, Florida

Problem? Since the early 90's, FHWA encouraged road and bridge agencies to implement a Pavement Management Program. While professionals agree there is value to a Pavement Management Program, the program can only be as reliable as the data input. While DOT's and

metropolises have professional staff to gather the necessary data, less urbanized areas do not have the professional capacity to accomplish this task. Thus, a major market, recognizing the value of a Pavement Management Program, must find a way to overcome this crucial void.

Solution? Coral Springs, FL, found a solution. They discovered Infrastructure Management Systems, Inc. (IMS), of Arlington Heights, IL, had equipment that not only read the road and base condition electronically, but this objective data could be transferred directly to a pavement management software package.

Presentation? An interactive classroom session was held in the morning and included presentations on every aspect of the project. The afternoon was dedicated to a live demonstration of the data gathering process. Each participant rode in the equipment van as it collected real-time data from Coral Springs streets. The case study concluded with a real-time demonstration of the numerous ways Coral Springs compiles and evaluates this data for financially-sound pavement management decisions (see Fig. 1).



a) equipment van for collecting real-time data



b) Dynaflect machine performs a non-destructive sub-surface condition survey

Figure 1. Effective Technology for Pavement Management Used in Coral Springs, Florida

Result ? To date more than \$2,300,000 has been invested by additional local agencies who attended this PDP and are implementing the IMS pavement management program.

Unpaved Roads ? Orange County, Florida

Problem? Unpaved roads create problems associated with routine transportation, mail delivery, emergency vehicles and dust control, and are twice as costly to maintain as paved roadways.

Solution?Orange County Public Works Engineers discovered that Open Graded Emulsified Mix (OGEM) had been in use since 1966 on low-volume logging roads in the Pacific Northwest. FHWA research determined OGEM had the ability to resist thermal cracking, rutting and fatigue. With an average cost of between \$5-\$7 per square yard - including base preparation, in-house labor, materials, equipment and sodding for a three-inch thick application, Orange County developed a strategy to pave all 250 miles of unpaved roads in their county within six years.

Presentation?The Orange County Engineering staff and two contractors participated in the interactive case study. Every aspect of the project, from initial development through the base preparation and stabilization process, including the EPA permitting process, was covered in detail. Attendees then visited an actual construction site to experience the entire paving process.

Result?To date, more than \$26 million has been invested in similar projects and more are approved by city and county commissions each month, all a direct result of attending this single PDP.

Pedestrian Safety ? City of Lakeland, Florida

Problem?According to the National Safety Council, pedestrians account for almost 50 percent of traffic fatalities in urban areas and their chances of being struck by a motorist increases 1,100 times at night. Add to that the human tendency in residential areas to cross randomly mid-block and urban traffic planners face a significant challenge.

Solution?The City of Lakeland became aware of a new, experimental automated in-roadway warning system designed to alert approaching motorists of an occupied crosswalk. The system can be installed to automatically activate when a pedestrian enters the crossing zone. Lakeland found the system particularly effective at mid-block crosswalks in school zones and in residential areas where no signals or other traffic control devices are present or feasible.

Presentation?The City of Lakeland Public Works and Traffic Operations Department staff and the manufacturing vendor participated in the classroom portion of the case study (see Fig. 2a). All aspects of the project were thoroughly discussed and since this device is listed as "experimental" on FHWA's list of control devices, the process to be followed by agencies wishing to install similar systems was covered in detail. Participants visited several real-time sites and experienced the effectiveness of this device from both the pedestrian's and motorist's viewpoint (see Fig. 2b).



- a) Seventy-nine professionals ??representing 46 Florida agencies ??attending class b) Daytime visit to the crosswalk site for close inspection of the equipment and its operation

Figure 2. New Crosswalk Technology for Pedestrian Safety in Lakeland, Florida

Result? While the Automated Crosswalk system continues to move through FHWA's approval process, to date eight agencies have sought FHWA approval to implement this technology, all based on attending this PDP.

Urban Congestion Mitigation ? Clearwater, Florida

Problem? Traffic congestion is a challenge for every urban center, but when the affected area is a major vacation destination, economic survival is at stake. Today, right-of-way property acquisition costs have all but eliminated the easy answer ? widening streets ? as a fiscally responsible, corrective measure. At issue in Clearwater, Florida, was a beach entry street network configuration consisting of nine intersections ? three of them signalized ? handling a traffic volume that fluctuates seasonally between 30,000 to 42,000 vehicles per day ? well beyond efficient capacity.

Solution? When the City of Clearwater installed a roundabout as a solution to this major urban congestion situation, they created quite a stir ? not only among transportation professionals, but in the public arena, as well. While most of America is becoming comfortable using less complex versions of the roundabout in addressing residential traffic calming issues, Clearwater raised the bar and used it to solve a major urban congestion situation . . . and they brought it all together in one year, start to finish (see Figure 3 below).



Figure 3. The Clearwater Beach, Florida, Entryway Roundabout: A Balanced Evaluation Experience

Presentation? The interactive workshop session included the City's Engineering and Construction staff, the design consultants and the construction and landscaping contractors. Every phase of the project was discussed including the volatile public relations aspect. The status of each pre-established goal was assessed and discussed including pedestrian accessibility, vehicle capacity, safety elements for elderly and children, traffic calming efficiency, reduction of pedestrian/vehicle conflict points and emission reduction estimates.

Guided walking tours provided an opportunity for attendees to experience the pedestrian-friendly aspects and allowed participants to interact individually with project engineers. In addition, observation from the 10-story rooftop of the meeting site provided a unique perspective of the entire roundabout project in operation.

Result? Engineers and public officials from California to Carolina and from Canada to Miami came to learn first-hand about this bold solution. While measurement of this PDP's effectiveness has only just begun, here are a few voluntary observations made by attendees:

"The best thing overall is having this meeting at the actual site," and, "The assessment of before-and-after conflict points with pedestrians and vehicles was an eye opener," and, "It was refreshing to hear of the successes, challenges and, yes, even the mistakes made in the process," and, finally this unsolicited endorsement from a design engineer from the City of San Diego, California, "I came to this case study with my mind made up that a roundabout was not a viable traffic mitigation solution from a pedestrian standpoint. After listening to these presentations and actually walking the entire roundabout as a pedestrian, I've changed my mind." This latter voluntary statement was made before the entire assembly during an open forum. It should be noted, this design engineer is blind.

Summary

Today every discipline struggles to keep pace with the explosion of new technologies flowing from the research pipeline, all created by public demand for improved services. By coordinating with industry, local agencies, state DOTs, and the research community, the TIA PDP provides a proven method for hastening implementation and justifying the research investment. In just two years, two of the four PDP's described above generated more than \$26 million implementing technology in a market most considered financially unable to participate in the technical revolution.

The TIA PDP initiative clearly demonstrates that we have made substantial progress toward achieving our goal of hastening research implementation.

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