

ings over the years have included technology transfer as major items on their agendas. Probably the most important information groups are the committees supported by larger organizations such as AASHTO and TRB. All these informal group activities provide the essential communication networks that fill the gaps in information exchange left undone by the more formal efforts. In accomplishing the described state activities, federal resources from programs such as the federal-aid, demonstration, National Highway Institute, implementation, and highway planning and research programs, have been used in addition to state funds and personnel.

CONCLUSION

Technology transfer is not new: What is new is the emphasis to accelerate the process, to shorten the time it takes for usable research to become accepted practice.

What is new is the emphasis to create the multiplier effect from federal to state, from state to state, and from state to city to county. These are the key objectives. I believe the programs and activities discussed provide evidence that, during the last few years, great strides have been made by the highway community in bridging the gap between research and practice. The foundation is now set for further improvements, and to do this requires that the momentum of our current efforts be continued.

REFERENCE

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Local Government Technology Transfer

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This paper describes the initiation and progress of a university-based technical-assistance program for local governments. Initially funded by the National Science Foundation, the program began with a statewide needs-assessment program that had input from both municipal and county officials via five workshops. Both technical problem areas and barriers to technology were identified and categorized. The program has operated for more than three years, providing technical assistance via quick response to individual requests, technical workshops, and major research and development projects, which use faculty and students. Examples of technology-transfer programs and some assessment of their credibility and impact are presented. Recommendations for newly emerging programs are summarized: (a) an attitude of sharing with other organizations is essential, (b) local credibility is the single most important factor, and (c) work should be on user-selected problems. Inputs for future policies and programs are presented: (a) there is a significant need for a nonagricultural extension service, (b) to implement federal research there must be a final linkage at the local level, (c) definition for federal research must begin at the local level, and (d) federal agencies should give higher priority to implementation.

The Center for Local Government Technology is a public-service program of Oklahoma State University. It provides assistance to city and county governments in the implementation of engineering and management technology in order to improve the productivity of delivery of local services. Oklahoma is a relatively young and rural state. Local government bodies consist of 77 counties and approximately 982 incorporated villages, towns, and cities. Income is generated from agriculture (40 percent) and petroleum and manufacturing (splitting the remaining 60 percent).

The program began with a National Science Foundation (NSF) grant to conduct a statewide assessment of local needs and to develop a program that might best meet these needs. A series of five district meetings was held with county extension directors and other local personnel from the Cooperative Extension Service. The purpose of these meetings was to establish personal liaison between the program leaders (Joe H. Mize, Charlie A. Burns, and myself) and to explain how the

center would relate to the established extension program. Next, a series of five workshops was held in these districts to meet with government officials from local municipal and county governments. These workshops established problem areas and technical needs, current resources, and barriers to the use of technology as a problem-solving tool. Technical problem areas were grouped into three major categories, which were divided into subgroupings as indicated below:

1. Equipment management—specifications preparation and selection, maintenance, and replacement decisions;
2. Public works management—planning of road and bridge systems for rural counties, street maintenance, planning and operation of solid waste systems and water and sewer systems, and calculation of the costs of public services; and
3. Manpower management—job descriptions, manpower scheduling, determination of optimal crew size, incentive plans, manpower training and retention, and functional organization.

During these meetings, six major barriers to technology transfer were identified:

1. Unawareness of information,
2. Lack of trained personnel,
3. Inability of experts to be understood,
4. Inadequate finances,
5. Lack of confidence in technical information, and
6. Resistance by operating personnel.

Many potential resource agencies and organizations were identified, but, on closer questioning, almost none provided the final link to the use of problem-solving technology. Most officials from smaller units of government were generally unaware of any potential resources.

CHARACTERISTICS OF LOCAL GOVERNMENTS

As a result of these workshops and three years of operation providing technical assistance, the following summary could be made regarding the nature of local government:

1. Expediency oriented,
2. Autonomy of operation,
3. More services demanded,
4. Tax burden too high,
5. Labor intensive but low pay scales,
6. No tradition of efficiency, and
7. Inadequately trained personnel.

Most elected and appointed officials are not inclined to make long-range plans. Most decisions are highly influenced by the term of office. There is little incentive to make tough decisions that will only bear fruit in the long term.

Most units of local government in Oklahoma are relatively autonomous from state and federal government. They guard this autonomy zealously and resent outside controls or influence.

Constituents of all governments are demanding higher standards of public service. Citizens of small towns expect benefits and services similar to those provided in larger municipalities. All citizens feel recent tax needs are excessive and resist providing new revenue sources.

City and county governments are labor intensive and expend a majority of their funds in the form of wages. Generally, these wages are below those paid for comparable positions in industry. For a myriad of reasons, most units of local government do not have a tradition of seeking to obtain an efficient operation. Few even attempt to establish meaningful measures of productivity. For whatever the reasons, smaller units of government badly lack trained people in both the operating position and lower supervisory levels.

PROGRAM OPERATION

The Center for Local Government Technology has adopted and adapted the basic strategy of the Cooperative Extension Service to the degree that funding limitations would allow. In all cases, the center seeks to emphasize that the ultimate product be problem solving in nature and usable by the appropriate personnel at the local level.

Major problem areas were first identified in the series of workshops held for local officials. A users' steering committee provides a major resource in the identification and evaluation of other major problem areas. In addition, a significant input resource comes from the feedback provided by local government officials on a statewide basis through personal contact, reference from the Cooperative Extension Offices, the Oklahoma Municipal League, state legislators, and "hot line" service offered by the center.

Major problem areas that require significant resources for research and development generally receive separate funding for research to be conducted by individual faculty and students. Center personnel assist in arranging for testing of results in actual municipal or county operations and help disseminate the material to other units of government via workshops, demonstrations, manuals, and fact sheets.

Center personnel generally provide the major portion of short-term (quick-response) technical assistance via personal interaction with individual local officials. This

may be the result of a technical request via the hot line or as a follow-through step after a workshop or seminar. The ideal technology-transfer process would make use of individual assistance to increase credibility. This is generally provided in the Cooperative Extension Service, but funding requirements make this impossible for the center to maintain on a truly statewide basis. As a result, the center tries to emphasize quick response, well-prepared and tested program materials, and multigroup assistance via workshops and fact sheet distributions. The professional staff of the center have degrees and experience in engineering and technology, but they often draw on the experience and expertise of faculty in other disciplines. It has been shown that, until the proper person in local government has been identified and informed, little technology transfer will occur. Reports disseminated without backup or local expertise are seldom used.

SUMMARY OF RESULTS

The most important results are not reflected in quantitative terms; however, even in these terms steady progress can be documented. For example, during the initial stages of the program, the center received approximately one request for technical assistance per week. Now the center receives more than that just from out of state. Our most recent survey indicates approximately two or three requests per day, an increase of 10-15 times. Credibility has been greatly improved. For example, we now get requests from user groups to assist in their own programs, such as the annual training programs of the City Managers' Association of Oklahoma or the Oklahoma chapter of the American Public Works Association. A total of 112 officials from Kansas, Arkansas, Colorado, and Texas attended a recent two-day workshop on municipal flooding. The examples below are given as a measure of the impact of the center on municipal and county governments.

One problem identified in the original needs study was the need to replace faulty bridges on the county road system. Funding had not been available and replacement costs were excessive. L. A. Maciula developed the concept of a mass-produced, field-assembled standard bridge design. Together with the County Government Educational Services Center of the University of Oklahoma, we presented and explained this concept to the governor's office, the state legislature, the Oklahoma County Commissioners' Association, consulting engineers, the Oklahoma Department of Transportation, and the steel and concrete industries of Oklahoma. The Oklahoma Department of Economic and Community Affairs provided funds for the design of a series of prestressed concrete bridges and the United States Steel Corporation provided the design for longer standard-format steel-based bridges. The state legislature appropriated \$250 000 to conduct a series of demonstrations of building new bridges by using these designs and to plan for a larger program next year. The center is responsible for developing and monitoring this demonstration program; the University of Oklahoma center is preparing plans for next year's more general program. A legislative committee appointed to review this problem has recommended a \$5 million/year program. It is important to note that this year's appropriation of \$250 000 is the first time in more than 30 years that money has been appropriated to county government. So far, three bridges have been constructed and others are in various stages of planning.

The center also brings previously developed technology to the attention of local government via a demonstration workshop. In this case, an instructional work-

shop is conducted in the morning to present the concepts and the details on the merits of the technology and how it should be used. In the afternoon, the participants attend a working demonstration of this application. An outstanding example of this was the demonstration of the use of Mirafi sheets to control groundwaters under a surfaced road in Stilwell, Oklahoma. Both municipal and county government provided men and equipment to remove the existing section of road, prepare drainage, install the Mirafi sheets, and relay and surface the roads. Municipal and county officials and workers from both Oklahoma and Arkansas attended. This was the first use of this technology in Oklahoma. We would like to think that this program has many similar examples.

The problem, or imagined problem, of overlap with other organizations has been minimal. In essentially every case where a problem has appeared to exist, when contact was made, the problem was either nonexistent or resolved simply. After the first series of workshops on needs evaluation, the center decided that its role would be in the area of engineering and management technology because this area had the greatest void. Another major reason for the minimal problem is the philosophy adopted at the start of this program to not create problems via turf wars. The needs are so great that no organization can fill the demand—so what if two organizations provide similar service? Cooperation has resulted in strengthening both programs. A classic example is the relationships of the center with the Oklahoma Municipal League. The center serves as a major technical resource and backup for the league. In this mode, the league often delivers program material developed by the center. This may give the appearance of overlap, but it is really a significant cooperative effort. In most cases where program overlap is cited, it is due to the lack of awareness of information on the part of the viewer.

Different approaches must be taken to deal with the needs of county versus municipal government. In general, the causes of these differences may be attributed to the following:

1. County commissioners are elected; most city managers are professionals, hired especially for that capability;
2. Municipal services are much broader and thus require a broader base of technology; and
3. County government (with the exception of a few large counties) is influenced by rural or agricultural needs much more than are towns and cities.

Additional problems arise from turnover of personnel. This results from elections, dismissals, and normal job switching. It would normally be a significant, detri-

mental factor at both the state and local level due to the importance of maintaining program identity, awareness, and credibility. This appears to be typical and must be coped with; therefore, new programs need to be fully aware of this problem.

RECOMMENDATIONS

To summarize what we learned into a requirement for success to share with newly emerging programs, the following items are proposed. An attitude of sharing with other organizations is essential. Turf wars are nonproductive and deadly. Good projects create enough glory for all participating organizations. Share projects, publicity, and success with all organizations that should be appropriately included.

Local credibility is the single most important factor. This means deliver solutions, not reports. Quick response is essential. All material must contain the appropriate level of technology presented in operational terms. Your people must conduct investigations on site, not in the office. Work on the problems identified by your public, not the ones that you are interested in. Be sure your solution works and makes them look good.

A significant need exists for a nonagricultural extension service, in both the public and private sectors. However, it must present usable problem solutions, not just social programs. It must have a federal base of funding, but funding does not necessarily have to be 100 percent federal. The service could be effectively located and operated by a state university. Economics could result if a working relationship could be established with the cooperative extension service.

If the results of federal research are to be used on a broader basis, the dissemination mechanism must have a final implementation linkage at the local level. Simply spreading the work via reports, brochures, computer networks, or the like will not promote use. Federal research that is to be used at the local level must begin with problem definition at the local level and end with a field test of the results at the local level to ensure that the material can and will be used. Federal agencies should give higher priority to the implementation of the results of their research. To do this, a mechanism that links all federal agencies to local users must be developed and used. To prevent excessive duplication via many federal networks, they should give serious consideration to funding local programs to provide this final on-the-spot linkage.

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Local Government Technology Transfer: A Service User's View

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Technical information gathered as a product of research is most valuable when it is usable in day-to-day applications. Useful application of technical information can be achieved early if recognized conduits of infor-

mation are established and the relationship of researcher and implementor are recognized. The Federal Highway Administration, state departments of transportation, and National Association of County Engineers