veloped for its use. For the user, this kind of system provides instantaneous access to both text and important facts needed.

The development of automated information systems has not yet affected critically the quality of information as perceived by the user. The ones most vitally affected by these automated systems are intermediate users, such as libraries and information offices that obtain easier referral service. But the expense and complexity of the system are much too large to be outweighed by this somewhat simplistic benefit. The potential advantages of the automated information system are much larger. The TRISNET system must be recognized and promoted actively by those who know or suspect its value. The information user who has in the past despaired about ever getting good information service must speak up and be heard. He or she cannot rely on the limited community of professional librarians or information managers to do the entire job. Users pay for the service and are the ultimate recipients of its advantages. They must make their preferences and interests known. More users must participate in the development of this exciting new resource for transportation research and development.

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My paper has 2 parts. The first provides a brief summary of TRISNET rationale and expectations, and the second suggests actions that should help to translate TRISNET concepts into reality.

TRISNET ENVIRONMENT

From a broad perspective, the rationale for TRISNET stems from an information crisis; a crisis that arrived shortly after World War II and that, despite efforts of many people and vigorous application of computers, has not yet begun to abate. Although this crisis is nothing like the environmental or energy crisis, nevertheless it is real and of major proportions. It has many dimensions, but I will mention only four.

First, there is the dimension of volume, better known as the paper blizzard. The volume of papers that accompany modern transactions is slowly getting out of hand. For example, the paperwork in the U.S. international trade alone is estimated to exceed 800 million documents and 6 billion copies per year (1). In the area closer to our technical interests, the accumulated stock of some 25 to 30 million documents is increasing by an annual addition of 1½ million of articles, reports, and books. Add to this thousands of millions of raw observations, miscellaneous measurements, and basic data that require special processing before they are converted into technical reports (2) and the problem acquires truly serious proportions.

Second, the dimension of experience has created a sort of "technical literacy gap" (3). The introduction of computers to deal with the paper blizzard has brought a gap of competence, which shows in many instances between the top management and the providers of information services, between generations of managers, between information users and information providers, and between transportation researchers and transportation planners. My department, for example, is spending considerable resources for the development of computerized planning and decision models. In most instances, these models will land in musty document repositories because very few users are currently capable of applying them in real-life situations. Similarly, advanced computer programs that can simplify and speed up the organization and use of technical and managerial information exist, but their full exploitation depends as much on the background of the user as on the efficiency of the computer.

The third dimension is that of information quality. Despite the progress that has been achieved in screening large data bases against technical keywords and despite many fine "selective dissemination" schemes, we have yet to find a way of discrimi-

nating between "good" information and information that is "superfluous." Even more important, our systems have yet to learn how to provide the user with only 1 or 2 documents that contain the bulk of the information he or she actually needs and to forego the sadistic pleasure of burying the user under an avalanche of computer printouts.

The fourth dimension is that of organization and management. Information specialists and funds are scarce, user demands shift, systems lack flexibility in responding to new demands, and higher initial investments are needed in new information technologies. In addition, ad hoc and ill-planned information gathering exercises proliferate, scarce intellectual resources are spent on essentially clerical operations, and the parenthood of information services is unplanned. Current estimates suggest that some 15 percent of the time of research staffs and as much as 20 percent of the time of research management staff are spent on documentation tasks (4). Similarly there is plenty of evidence that new information agencies are being set up with little if any thought given to whether an existing service might not be reorganized to perform some additional function at lower cost.

It is in the context of these dimensions that the initial idea and plans for TRISNET were generated and later outlined in a report to the congressional Appropriation Subcommittee (5). In that report, the Under Secretary of Transportation committed DOT to provide leadership and assistance in the construction of not another transportation research information service but a national network of transportation information services that would make the existing information resources more effective and thus more useful in the achievement of the declared transportation goals of that department.

TRISNET was planned by a DOT-sponsored committee organized under the aegis of the Transportation Research Board. The committee is now in its second year of planning and has released its second report. The elements include a coordinating body, a common data base of literature abstracts and research résumés, a document delivery subsystem of regional libraries, the on-line access to selected portions of the data base, and a directory of statistical and other data bases that may be useful to transportation technologists and planners.

TRISNET is envisioned to become a confederation of the existing key transportation research information services, and this means that the initial members of the network will retain their identities and their clientele. But in doing so, I do not think we should ignore the fact that as the network evolves many services will have to adapt to the new environment created by the sheer existence of the network. Some may have to modify their operations. New services may emerge as a result of recognized needs. Some services may have to be discontinued because of their internal inefficiencies or changing user demands. This will naturally generate many problems that will require sound planning and astute leadership.

SUGGESTED ACTIONS

The actions necessary to bring TRISNET into existence include securing a broad base of understanding and support, establishing the framework of operations, and devising a realistic scheme of financing the common services that are required for efficient operation.

Recognition of Need and Opportunities

There are still an insufficient number of influential people in government or industry who appreciate the true nature of the current information crisis. There are even fewer people who are aware of the opportunities that could be provided by an information network that is envisioned by the TRIS committee. Until their awareness is significantly heightened, the chances of obtaining a broad-based support for TRISNET will remain low.

This awareness will come about either when the facts by themselves become so evident that they can no longer be ignored or when TRISNET planners make them evident through a concentrated program of education. Since the elements of an information crisis are seldom self-evident, a well-designed education program will be

necessary for the information users as well as for the information suppliers and their sponsors.

I have already initiated actions in DOT to bring about greater awareness among the policy-makers, and additional actions are planned. One of these actions is to establish an experimental technical information center that will provide access to TRISNET services and undertake a limited program of user education. Another is an R&D information newsletter that should aid us in reaching many people who have never heard of TRISNET and provide a forum for user feedback.

But much more needs to be done, and the TRIS committee has wisely recommended a number of actions that should be vigorously pursued in the coming year. One such action is the calling of a user needs study conference that will organize and classify transportation user needs and deduce from these needs a set of functional requirements to be met by the network services. The other is the development of a multifaceted plan for marketing of the network products and services. The development of this plan should be given first priority in the next year's planning agenda.

Rules of Engagement

Even if the awareness of the problems and opportunities is created, the network cannot come into existence until the consent of its prospective members and supporters is secured. Before such a consent is given, however, the prospective members and their sponsors will want to know the terms of the confederation. They will want to participate in the formulation of the rules of engagement, be assured of specific benefits that the network will provide, and be able to compare these benefits against the costs that will have to be incurred in the process.

A network charter and bylaws must be developed and tested in the real-life environment of the participating services and sponsors. This should be the first assignment for the TRISNET Managers Council, which is being proposed in the TRIS committee report.

Financing Common Services

If any long-term DOT commitments are needed (as they are likely to be), they must be secured through a normal budgetary process. This means a program review, a phased plan of action, and the schedule of milestones and planned accomplishments. This plan will have to be presented to the appropriate offices of the Secretary of Transportation and to the individual administrations for concurrence.

As the sponsor of the project, it is my obligation to arrange for a proper DOT review of the TRIS committee proposals and secure required policy decisions. I have discussed this matter with the Office of R&D Policy and was assured of its assistance. I also intend to work with the TRISNET committee and arrange for the appropriate presentations within the department so that the department's role and commitment to TRISNET is clarified at the earliest practical date.

But the initial DOT support of the network, important as it will be, will carry the network only so far. In the end, the network will survive and prosper only when it is able to secure a broader base of support from state and local governments, industry, and academic institutions.

If the network is to survive, this support will have to be tangible, stable, and substantial. The TRIS committee has wisely identified the expected costs and suggested a general scheme for obtaining the necessary revenues. Unfortunately the scheme is based solely on federal support, and federal support, which traditionally has been substantial, is anything but stable.

One excellent example of financing a network is the highway networks, which was built with funds from the Highway Trust Fund, which in turn was derived from a tax on the most basic commodity purchased by the highway users. A similar approach has been used to develop a network of national air control facilities. Perhaps a similar approach could be considered by the TRISNET planners to be used initially as a supplement to and as an eventual replacement of the uncertain federal support.

CONCLUDING REMARKS

I would like to end my comments with a reference to a recent conclusion of the Organisation for Economic Co-operation and Development. Discussing the usefulness and applicability of scientific and technical information systems in today's changing society, OECD stated (6), "Governments are increasingly faced with problem areas requiring organized research and action programs: urban development, transportation systems, environmental improvements, energy services. It is difficult to attack such problems successfully with the static, vertical structures traditional to government, for concerted multidisciplinary activity by both public and private researchers are required. Not only are scientific, technical, economic, and social factors involved, but the four functions of research, development, policy-making, and administration must go hand in hand. Thus, information systems may be required to serve the needs of these four types of functions."

I believe this conclusion deserves deeper study and application in the development of the TRISNET.

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