

- **Combination.**

Due to the scale of the program and the tie with research, housing the research within TRB seems to be the most promising option. However, selecting research topics and identifying appropriate contractors should be streamlined. This would reduce the response time from identification of the problem to initiation of the research -- a priority in this program. The ongoing reporting aspects of these projects might require a few changes as well.

PROJECT PRIORITIES

With an estimated cost in excess of \$6 million, the scale of this program is clearly beyond the level of research funds that are readily available. While the selection of research priorities involves judgement, some research topics may address higher priority problems and may serve as building blocks for follow-on research. As mentioned above, the 20-24 Panel has decided to initiate the first half of the Market Research Program. In the personal opinions of the authors of this report, the following research topics appear to offer early promise: Senior Executive Service, System Performance, Middle Manager Training, and Contracting Out.

GAPS IN RESEARCH FUNDING: REASONS AND POSSIBLE REMEDIES

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As Chairman of Group One Council, I have been instrumental in pushing on with our deliberations on research needs, following my predecessor Bill Bulley, who initiated the Group One Council's interest in this area. It was under Bill Bulley that NCHRP Project 20-24 was generated. In my presentation I will try to give you a synthesis of a fairly lengthy discussion that we had at a meeting involving the Group One Council and a number of resource people in September of 1987. The meeting was prompted by a strong sense that research funding in transportation, particularly on the "soft" side, had been declining rather dramatically. We wanted to try to understand firstly whether that was true; secondly, what the reasons for it might be; and finally, what remedies there might be for this problem. At the time, we did not have the benefit of the excellent review prepared by Nan Humphrey -- we were deliberating in the absence of the kinds of numbers she assembled. Fortunately, I think our deliberations were based on assumptions that are consistent with her numbers.

In September we brought together a number of people on the buyer's side of transportation research, and some people on the seller's side, to give us their perspective on what was happening with transportation research spending. We then had a structured discussion with a facilitator to try to distill out of this information what really was happening and what might be done about it. The reason for Group One Council's interest in this subject is that the Council is designed to be an umbrella group over all of Group One -- and if you think about that, that means all modes. There are about 25 people on the Council, and they are carefully selected to represent all of the modes. One of the first things you find when you come onto the Group One Council as a new person, as I did a few years ago, is how fragmented modal activities really are. When people from highways, transit, rail, air, and waterways get together, often they find that they don't know each other very well, if at all. We don't talk to each other very much -- and we don't generally look at things in a multi-modal way. To try to turn the multi-modal composition of the Group One Council to advantage, we decided at our September 1987 meeting to get input on research funding from representatives of all the modal areas, and to make some comparisons between what was going on in those areas. We wanted to look at different ways in which research was being funded, in the hope that we'd find some that were doing well that we could use as models to improve others that were not doing so well.

The presentations that we had from the buyers of research were from the National Cooperative Highway Research Program (NCHRP), the U.S. Corps of Engineers, the National Science Foundation, the Federal Highway Administration, a representative of a state DOT who spoke about state sponsored research, the Association of American Railroads, the Chairman of the Transit STRS Committee, and a representative from the Urban Mass Transportation Administration. Representing the sellers or providers of research, we had speakers from the Council of University Transportation Centers (CUTC), a university professor interested in freight research, and representatives of some of the Group One Committees in TRB. We had one person who reported on a joint committee meeting that had been held a few weeks earlier, in which a number of transit and highway committees got together to talk about the emerging suburban congestion problem.

I am not going to try to summarize in any depth what these people told us, but I do want to give you

a few of the highlights as I saw them. With regard to the NCHRP, the notable points were earmarking of a fixed percentage of federal highway funds for the program, and also the orientation of the NCHRP research program to applications questions. The speaker, Bob Reilly, had a very nice chart that shows NCHRP on varying dimensions such as arrange between research and development and training and implementation, between applied and basic research, and between AASHTO priorities at one extreme and researchers interests at the other extreme. NCHRP also looks for projects with a high probability of success. As good as NCHRP is, and as great a contribution as it makes, it does not cover the waterfront of transportation research.

With regard to water research, it was notable that the Corps of Engineers spends about one percent of their total revenue on research and they try to keep their funding at about that level. Because they're a relatively unified operation, they are able to keep their research funding pegged at this fixed percentage. By comparison, for the other areas of transportation, which are very fragmented by mode, by level of government, and by public versus private, it's virtually impossible as Nan Humphrey demonstrated to even identify the overall percentage devoted to research. Since we don't have that number, we are in no position to know whether we're keeping to a certain level or not.

The comment from the National Science Foundation was that we shouldn't expect to see an explicit transportation program at NSF. NSF may happen to touch on transportation in the process of performing economic research or social service research or other research but that will be largely by chance. We shouldn't count on NSF for any explicit effort devoted just to transportation.

With regard to FHWA and UMTA, the important characteristic was the shift to short-term policy oriented research and away from basic longer term research. It is this shift that has accounted for much of the decline in the long term basic research funding over the last six or seven years. The representative from the Association of American Railroads pointed out essentially what Nan Humphrey's slides showed; that FRA has been cutting back, and private industry has been trying to increase research funding. AAR staff members have been administering a lot more research, but they feel like they're very much up against budgetary constraints, and are unable to do as much as they should be doing.

The Transit STRS representative reported on a plan to earmark a portion of the federal Section 9 money for a new research program that would generate about \$10 million a year, to be oriented to practical day to day problems of the transit industry. Two concerns were raised about this program: firstly, \$10 million is not a lot of money when you compare it to earlier levels of UMTA funding, which were close to \$100 million at one point, and secondly, if federal Section 9 monies continue to go down as they have been doing, the research program, which hasn't yet even been created, will also go down. Shouldn't we try to earmark a percentage of state contributions to transit, as well as local contributions, and even fare box revenue? If you're interested in getting a certain percentage of your revenues devoted to R&D, you've got to look for your base to a much broader set of sources than just the federal government, because its share of revenues has been going down.

On the seller's side, there was a lot of discussion about the fact that the buyers don't want to fund basic research or long term research; they want short term, high payoff types of research, and there's a real dearth of funds available for long term research. The universities are particularly concerned about this phenomenon. We had quite a lengthy discussion about the new University Center program that was created in the 1987 Surface Transportation Act. The program provides \$5 million a year from UMTA and an equivalent amount from FHWA, and it requires a 50 percent state and local match. If it all comes together, it will provide for \$20 million a year of research in the highway and transit areas, which is a substantial amount of money -- \$100 million over five years.

However, this University Centers program will be run by a national advisory council which will include several U.S. DOT people. The Secretary of Transportation makes the final decision about the research topics. A concern here is that the program may be geared to the same short-term policy oriented research that has been supported by the federal government over the last five years. There's considerable uncertainty as to how much of that money will be approved for projects that really are basic long term research. The common theme in these presentations is that we have some serious problems. Funding for research certainly has gone down significantly. Even if the best options we have in the pipeline like the transit STRS program, the University Centers program, and the NCHRP meet our expectations, there will still be gaps related to the total dollar levels that we've had in the past,

and more importantly, gaps in subject matter – long term basic research in particular.

We followed these presentations with a structured discussion which dealt with two questions; why this decline in funding has occurred, and what the possible remedies might be. Barbara Harder, a member of the Group One Council, brought a person from Pennsylvania DOT to serve as a facilitator for the discussion. In quite an impressive manner he got this group of people from different modal areas organized into developing a consensus on a number of points. I'm going to report to you the results of that exercise. We concluded that there were seven major factors that were responsible for our problems, and we ranked them in order. The first factor was that funding agencies are simply not oriented to long-term, basic research issues. It is very difficult to get people who administer research budgets interested in funding long term research.

The second factor was that federal research funding has been oriented much more to supporting immediate policy priorities over the last six or seven years than it has in the past. There has been a reluctance to fund long term basic research that might not have immediate policy relevance for the federal agencies.

The third point which came out of the concerns of the university professors was that research interests of the research community and government research funding priorities do not match very well – they have begun to diverge. The fourth point was that there appears to be a lack of top management support in federal, state, and local agencies for basic research. It would appear that even project NCHRP 20-24 reported on by Richard Mudge will focus on some very specific areas of immediate payoff to CAO's as opposed to building our long term knowledge base.

The fifth point was that federal funds available for research have been decreasing over the last six or seven years, as indicated in Nan Humphrey's presentation. The sixth point was that research funding is very compartmentalized by mode. And that makes it very hard to do long term multi-modal studies: topics that involve relationships between modes, comparisons between modes, and comprehensive multi-modal analyses. The final point was that there is no politically potent constituency advocating research funds for planning and management; there is nobody to make loud complaints as the soft research funds were being cut.

In our discussion, we identified what we felt would be constructive responses to each of these problems. First, we concluded that we need to make a major effort to educate or reeducate potential funding agencies on the value of research, particularly long term research. We need to explain, in a much more convincing way, the relationships between short-term policy needs and long term research: in particular, that if you don't keep up your long term research base, there won't be anything to synthesize when a new CAO comes in. We've been living off our past research base to a large degree, it's declining, and we're not replacing it with new basic research for all of the quick answer type work that's so necessary. On the second point regarding the availability of funds for long-term research, the one strategy that seems to work consistently is to establish earmarked funding. The success stories here are SHRP and the NCHRP program, and the transit STRS proposal is heading in that direction. In this context, there was mention of private industries which routinely commit certain portions of their revenues to research. The gas industry, for example, devotes a portion of its sales or revenue to a central institute which does research for the industry. The understanding is that when you take in a dollar, you send a portion such as one percent into the central research pool -- that's accepted as the thing that you must do in order to keep your industry vital and competitive for the future.

The third point is to improve communications between researchers and funding agencies through techniques such as internships for researchers in administrative agencies, staff exchanges between universities and the transportation industry -- transit operators, highway departments, airlines and so forth. The establishment of joint research committees that would have both academics and other researchers and industry would also help. Other possibilities would be to set aside funds for individual unsolicited research proposals, and to fund student fellowships in transportation for university graduate students, with no restriction on research topics.

A missing ingredient that we were searching for here was a source of funding for innovative research stimulated by the researcher. Suppose a researcher comes up with a good idea, -- how does he go about seeking funding? In all of the current programs it's a tough battle to get consideration of an idea that falls outside the established priorities. Even for the NCHRP program, the lead time for the funding process can be on the order of two years --

if you think of an idea now, it's going to be two years before you can get funding, even if everything goes well for you. This is not to say that we couldn't do more in obtaining funding under the NCHRP program for soft research topics. The committees on NCHRP are willing to fund soft research projects and there have been occasions where Group One committees have really gone after that money, and gotten it. Those of us interested in the soft research area need to devote more effort to developing projects for NCHRP funding.

The fourth point was to educate top managers on the value of research – essentially an extension of the third point. The fifth point is a very important one. We should seek sources other than federal funds for research so that we're not vulnerable to major shifts between federal, state and local funding of various transportation modes. That means trying to earmark a percentage of state and local funds and direct user revenues for a research pool. If we're going to get one percent of total sales for research for example, we're going to have to seek one percent of all revenues. In the past we've gotten a few percent of the federal funding and little or nothing from other revenue sources. Now that the federal funding has gone down, the total percentage of sales devoted to research has gone down because we don't get anything from the other revenue sources. What this would suggest is that every time there's a gasoline tax increase in a state, you should try to earmark a portion of that for research, and every time there's a sales tax increase for transportation, you should try to earmark a portion for research. It may not be easy to do, but it's the kind of thing that we'll have to do if we're going to have reliable sources of research funding. The sixth point was to earmark funds for multi-modal research. There was a feeling that multi-modal research would not get done unless there was a certain portion of funding set aside for it, either as a portion of the total or through some formal pooling of modal research funds. The final point dealt with getting some political support behind research funding. The major notion here was to make the case every time there's a proposal for a new transportation funding program – a new tax increase or a new source of revenue for transportation expenditures – that one percent or so should be taken right off the top for research. In the past, this has been the successful way of getting research funded.

If we could create as an accepted practice the concept, as the Corps of Engineers and the gas industry appear to have done successfully, that you really ought to put one percent into research, we

would be able to get research funds allocated at the same time that increased expenditures are committed for things like highways, transit, commuter rail, airports, and other facilities.

In conclusion, our collective view was that the problem of inadequate research funding is very real, and even the best proposals on the table now will not meet the needs adequately. Once research budgets are down, as they are now, it's very hard to get them back up because research is not an easy product to sell. It's very hard to go to funding agencies and say, "Well, we want to triple last year's research budget", which is probably what we need. It will take a major commitment from everyone interested in this soft research area to get these funding levels turned around. The SHRP example might be a good model, in that there, a very concentrated effort was made, with a lot of justification of the need for substantial new funding earmarked as a portion of the highway trust fund. The NCHRP 20-24 appears to be producing some useful results focused on the needs of the CAO's. However, the research needs in the soft area are broader than that, and we're still very fragmented across transportation modes and in our particular interests. We're going to keep working at this in the Group One Council. We'll try to press on with this effort by increasing awareness of the problem and suggesting remedies for it. Hopefully we'll make some significant progress over the next year or two.