This report is an evaluation of the benefits resulting from the Breakthrough Innovations (BI) program, done by Minnesota Department of Transportation’s Management Analysis Unit.

This program provided a means for people to apply for funding outside of the department’s normal budgeting process. The program was greeted with enthusiasm. Since its inception, the program has generated several projects that may not have been funded through normal means. Because of funding availability, it has resulted in projects being funded sooner than they would have by other means.

The program began in the spring of 1992 when money was allocated from the 1991-92 budget to support “Breakthrough Innovations” (BI) projects submitted through department-wide application. In the initial year, seventy-two proposals were evaluated; nine received either partial or full funding.
Breakthrough Innovations
BREAKTHROUGH INNOVATIONS

'94 – '95 Project Evaluations

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BACKGROUND

The Office of Research Administration serves transportation practitioners through development of new research initiatives, acquisition and application of new knowledge, exploration and implementation of new technologies leading Minnesota toward a safer, more efficient and effective transportation system.

In order to assess the benefits resulting from the Breakthrough Innovations (BI) program, Mn/DOT's Management Analysis Unit was requested by the Office Research Administration (ORA) to do an evaluation of it. Two analysts, with input and counsel from the BI program coordinator, conducted the evaluation. The program provided a means for people to apply for funding outside of the department's normal budgeting process. The program was greeted with enthusiasm. Since its inception the program has generated several projects that may not have been funded through normal means. Because of funding availability, it has resulted in projects being funded sooner than they would have by other means.

The program began in the spring of 1992 when money was allocated from the '91 - '92 budget to support "Breakthrough Innovations" (BI) projects submitted through department-wide application. In the initial year, seventy-two proposals were evaluated; nine received either partial or full funding.
The program began with five specific goals

* Inspire innovations
* Create measures
* Promote collaboration
* Promote team work
* Create a decision process.

These goals were the yardstick by which the program was evaluated. The BI program is currently on-hold pending the outcome of this evaluation and other administrative decisions.
METHODS

The study team identified and surveyed fiscal years '94 - '95 program participants. Surveys were sent to all whose projects were funded. Some of those whose projects were not selected were interviewed over the phone. (Appendix A Breakthrough Innovation Evaluation Survey)

The team also reviewed previous year's projects and program and project evaluations as well as related research information.
FINDINGS

There are some specific references cited in the following areas. These references are meant to be representative and are not totally inclusive. (Appendix B & C, Survey Responses)

Survey results and interviews indicate the BI program:

Inspired innovations and tapped employee creativity. This has lead to advancement of new technology, encouragement of work related research, and stimulated creative thinking.

Resulted in the limited creation of measures for productivity, time, and money. Specific measures were identified for the projects; however, the identified measures were not implemented in most cases. Project managers seemed to lose track of them over the course of the project. Hard evidence supporting cost effectiveness is generally lacking; however, one of the project managers cited considerable time savings. According to the project manager, "Documenting Traffic Flow Baseline Conditions with a Video Ground Truth Recording System . . . resulted in reduced man-hours of up to 100% for some tasks."

Several project managers cited anecdotal evidence to support the creation of efficiencies. Some examples are:
*Desk top conferencing software provides on-line user support and saves time through not traveling to the user location.

*Collection of field soils data using bar code readers can speed up the data entry process.

*Automated bridge standards retrieval and transmission system eliminates the need for mylars and reduces use of out-dated information.

Collaboration that enhanced interagency cooperation, partnerships, and private sector relationships was cited in the Rail Grade crossing project which was a project comprised of five agencies. This project is a partnership that addressed issues that could not be addressed without appropriate public and private cooperation.

Another example of collaboration was demonstrated in the Nuclear asphalt gauge project -collaboration produced new ways of interacting with external agencies that will be of benefit in the future.

Promoted team work through increased dialogue within a work area and between units; and, promoted shared responsibility for team members who participated in the program. An area that has been traditionally tight knit expanded its limits to include the private sector. Other examples are:
Teamwork improved the quality of consultants work on the traffic flow baseline project. The market research also brought together members of the shipping and trucking communities, some of whom continue to serve on other Mn/DOT committees (Federal Preemption project).

Created a decision process for management that resulted in a dynamic post selection process.

Successful program applicants are overwhelmingly in support of continuing the BI program. The program was successful in terms of its original goals; however, it could be billed as a failure because of the absence of benefit/cost analysis for each of the projects.

The program created the opportunity to expose the department to the concept of measuring and evaluating our work contemporarily with the establishment of Measurement and Evaluation and prior to the development of the Family of Measures. And, it has given ORA a process to better select and manage these types of projects. Finally, BI has contributed to Commissioner Denn's goals of innovation and learning as attributes of Mn/DOT.

Several project managers didn't want to deal with accountability, measurements, and milestones. Their preference was to be given the money and check back in a year or two
when they were done. While this attitude is not uncommon within the agency, it makes evaluation of the program more difficult.

Three managers interviewed expressed their concern that the program allowed projects that would not have been funded at that time to move in front of more important projects. This split the staff available to work on the project and created problems for previously established priorities.

(Appendix D, Breakthrough Innovation Program Projects)
RECOMMENDATIONS

CREATE A REGULAR FUNDED PROGRAM.

Create a program that is dependent upon creation of measures and regularly scheduled project evaluations. While it will vary for some projects, all projects should be evaluated for progress based on per-established measures. Annually, recommended funding for the program is $125,000 (previous annual funding was at $375,000). The rational for the funding reduction is that many of the projects could be appropriately funded under the Research Implementation Program. Administering the funds at ORA would provide a more controlled environment in which to manage the funds on a program level.

ESTABLISH A MEANS TO MARKET THE INNOVATION PROGRAM

Establish a means to market the Innovations Program. Many project applicants, unsuccessful and successful, are not aware of how to obtain funding for research projects.

CREATE A USER GROUP TO REVIEW AND REVISE THE INNOVATIONS PROCESS

Several survey respondents commented that the selection and post selection requirements were cumbersome.
RENAME TO *INNOVATION PROGRAM*

Rename the program to *Innovation Program*. The name Breakthrough Innovation is not what the program is. Many of the projects do not represent technology break-throughs but make use of existing technology. However, they are creative departures and innovations to Mn/DOT.
APPENDIX A

BREAKTHROUGH INNOVATION EVALUATION SURVEY
BREAKTHROUGH INNOVATION EVALUATION SURVEY

PROGRAM EVALUATION

1. In your opinion, what are the successes (or failures) of the BTI program?

2. The BTI program started as a response to “left-over” money at the end of the fiscal year, should BTI be a regular, continuing, funded program? Why?

PROJECT EVALUATION

1. Did your project create efficiencies that can be measured? Specify. (Produce significant and measurable increases in productivity) (Measurable in time, saved $$$ and incorporate a mechanism to do so.)

2. Did your project encourage teamwork? How?

3. Did your project broaden the way we think about the business?

4. Did it support collaboration? Explain.

5. Did your project inspire cost effective innovations? Explain.

6. Did your project respond in a positive way to external pressures?

7. Are you on schedule? (Meeting milestones, baseline data?)

8. Would you have gone through with this project without BTI money?
APPENDIX B

SURVEY RESPONSES
BREAKTHROUGH INNOVATION EVALUATION

PROGRAM EVALUATION

1) In your opinion, what are the successes (or failures) of the BTI program?

The success of the program is the impetus given to many Mn/DOT employees to think about new ways to solve problems or to explore better technologies to carry out Mn/DOT's serving of Minnesota citizens. (1)

It successfully allows creative new innovations an opportunity to be investigated and tested. I believe this assists Mn/DOT in being a leader in many areas the department is involved (in). (2)

We believe that the BTI Program is a very good program for the advancement of new technology in Mn/DOT. The program allows work groups to purchase equipment not available through normal funding and conduct research type projects to evaluate the usefulness of new products. Administrators of the program seem to recognize that new ideas and changes in paradigms take time and don't always succeed. (3)

BTI is very successful because it encourages research and testing of new technologies within a working environment. (4, 5)

I think the BTI program has some merit in the organization. I only recall one success of the BTI program, that being the salt brine project to improve ice remove times. Since I only recall the one project with much detail I would consider part of the program a failure in that departmental awareness of what projects are being undertaken or have been completed is not communicated in an effective manner. (6)

The BI program is a success in that it gives management a way to clearly commit to a break through innovation. The inflexibility in budgets and the organizational inertia sometimes makes it hard to get new efforts going. It is amazing how the commitment of money allows us to go forward and helps open the doors internally for the project. (7)
Overall, I do believe the Program is a success. The program provided a means for Units to fund projects that otherwise may never have a change due to tight budget restraints. The process of applying, screening, and presenting to a selection committee was worthwhile. It was a good experience for myself. The overall structure of the Program is a sensible one. (8)

I was assigned to the project in mid field. It seems to me that there is a little too much "over the shoulder" concern for funding validity. (9)

Failure - The territorial hurdles (in my case), that must be overcome to execute the project. Example - we were interested in computer hardware/software for Bridge Inspection. The software was to be created. No way with issues like: ownership, copyright, distribution rights, MIS wanting to create it. It made the project ridiculously impossible and expensive to proceed with given funded level.

We improvised after a year or so and purchased existing software mated to specific hardware. It should no be this difficulty. (10)

Enabled funding of projects that fell outside the realm of "regular" funding sources. (11)

Funded project that had no division "Home". (12)

Successes - allows us to try experiments that we wouldn't if it came from our budget.
Failures - currently no follow-up is done to see if what was purchased is being used for what it is supposed to. (13)

Successes: The program itself. Allows us to shortcut long budget process. Gives people with ideas a process to get them tested or developed.
Failures: Once ideas are proven there is no process that assists in implementation into general practice with the DOT. (14)

I do not have an opinion of the program as a whole. I can only see the program from the perspective of a grant winner.
I find the program one of a very few ways to acquire funding for specialized equipment and applications. A funding mechanism for internal research and development. this is important in the search for and recognition of innovation on a small scale which certainly may lead to innovation and greater efficiencies on a larger scale.

The failure that comes to mind first is that the funding for the program is quite limited. R & D in many cases is very expensive and adequate funding enhances success. Another failure may be that when a proposal is selected for funding that administrators of the Program do not get involved enough in the development of the work plan. Greater involvement may help to ensure realism in project development, adherence to schedule and the ultimate success of the project. (15)

Since the inception of the BTI, I think things in Mn/DOT have changed significantly, however, when our original BTI project was submitted it sought funding to market research for creating a different approach to rate regulation of the trucking industry in Minnesota. At the time, Mn/DOT did not have a market research function as it does now and it was next to impossible to get funds for market research through the normal funding channels. So "success" to us was providing a mechanism for non-traditional research needs to be met. The failure was that by the time we figured out how to make regulation more responsive, the market place was already acting to eliminate the old inefficient regulatory model through deregulation. (16)

2) The BTI program started as a response to "left-over" money at the end of the fiscal year, should BTI be a regular, continuing, funded program? Why?

Yes, it would definitely be of value to continue the BTI program as an ongoing program. Technology is changing so quickly that Mn/DOT can not afford to be left behind. The old technologies worked well for Mn/DOT but many new technologies are constantly emerging that may be more efficient and effective than previous methods. (1)

Yes, because of the above stated reasons. (2)
Yes, we believe the BTI program should be continued as a regular, continuing program. The program helps keep Mn/DOT in the top five DOT in the nation. (3)

Yes! It creates an excellent opportunity for trying new technologies before making major commitments. This provides valuable knowledge that helps in making better use of the most appropriate tools for a given application. (4, 5)

I think the BTI program could be a regularly funded program but some changes would need to take place. When information systems BTI projects are presented they must be coordinated with the IRM plans. There is a perception that the office sponsoring the BTI program is an entirely separate entity from the rest of Mn/DOT with little coordination with other business units. I also think the program should be funded to get truly innovative projects researched. I say truly innovative because some mechanism needs to be developed to determine what is innovative as opposed to using the program as just another funding source in times of reduced budgets. (6)

This project does not fit into the fiscal year process of the state. We had to struggle to carry the $ over. The program evaluation time lines seem to be tied to the fiscal year and that also doesn't fit this project. Money should be set aside each year and offered well in advance of the beginning of the year so the start up work can be done. The predictability of future funds really helps. End of the year money only works well for projects sitting on the shelf. That doesn't describes new innovations very well. Also, start up and mobilization of an innovative project with many partners takes longer to get going and to have the money ready expire really handicaps the project manager. (7)

No response. (8)

Yes, although this specific project did not prove to be effective, it provides opportunity to expand and explore options beyond the realm of current standard practice. (9)
Yes, it creates an additional avenue for funding experimental projects which might not get funded, yet have significant impact on the way we do business. (10)

Program is great idea. However, it evolved into a cumbersome process driven (rather than product) program. (11)

Yes - it works. Simplify process. (12)

No, because there's always "left-over" money. (13)

Yes, this should be a regular funded program. I believe that the people with ideas are willing to continue developing ideas if they feel that there is a process that expedites the testing and development of these ideas in a reasonable time frame. Long term frustration in developing new process and technologies during the struggle to get funding. People like to be on the cutting edge and be associated with leaders in the industry. (14)

Yes, BTI should be a regularly funded, ongoing program. Ideas for innovative approaches do not come about only when they are asked for. If the Program were ongoing, innovators would at least have a forum for presenting their proposals.

Many innovations lead to others. An ongoing program may be able to recognize successful innovation with funding for further development of related or spinoff innovations. (15)

I think so. In his book Management: Tasks Responsibilities, Practices, Peter Drucker argues that research should be about "innovation", not "continual improvement". Yet, a glance at the annual research reports published by the department each year would indicate that the majority of our research is about improving what we already do. Improving pavements, snow removal, etc. Again, things are changing rapidly, but until a few years ago probably 99% of our research budget went toward materials and maintenance research. Even ITS which now comprises a substantial share of the research budget is primarily aimed at improving the capacity of our existing infrastructure. It seems however, that Mn/DOT is just beginning to ask, "are there
alternatives to the single occupant vehicle?" Telecommuting is probably one area where Mn/DOT is exploring innovations that will change societal attitudes and lead to long term transportation solutions but for the most part telecommuting is not viewed as research.

First, before addressing the list of questions a bit of background is needed for this project because the final project was completely different from the original work plan proposed. For several decades Minnesota regulated the rates of intrastate motor carriers. Carriers filed tariffs with the Office of Motor Carrier Services (OMCS) and they were bound to charge those rates. The concept came from the early days of the railroad industry when farmers were essentially held captive by railroads for the movement of their grain (that is why the Grange Movement started in Minnesota.) Rate regulation was established to prevent railroads and motor carriers from gouging the little guy. To enforce rates, OMCS field personnel would go to carrier offices and audit freight invoices. When errors were found (in 1994 audits performed by OMCS found the percentage of errors often exceeded 50%), the carrier could be fined. However, nothing in the regulatory scheme called for the shipper to be reimbursed for excessive charges they may have paid. So, the aim of the original research was to establish a cursory transportation rate audit for small businesses in Minnesota. Under the concept, small shippers would send a sample of their freight invoices for OMCS to review. If rate errors were found, the errors would be pointed out to the shipper with a recommendation that they seek recovery through courts or possibly have a more extensive audit performed by a private audit firm. The research plan was designed to identify potential users of the service (i.e. define small businesses for the program), and develop a marketing plan to get the right people involved, and also determine whether the program might be done on a fee for service basis.

Unfortunately, just as the last phase of the market research was to take place, Congress pre-empted states' ability to regulate trucking rates. As a result, the research plan was rewritten and the market research conducted with a new focus.
What is the role, if any, of Mn/DOT in this deregulated environment? (16)

PROJECT EVALUATION

1.) Did your project create efficiencies that can be measured? Specify. (produce significant and measurable increases in productivity) (Measurable in time, saved $$$ and incorporate a mechanism to do so)

Our project which used nuclear testing of asphalt suddenly became obsolete when a new method of asphalt testing became available using high temperature. We decided to switch to the new method and discontinued the nuclear program. Productivity and efficiency measures were not developed. (1)

It is in the process of demonstrating a cost effective method of erosion control by using vegetation obtained from Mn/DOT's rights of way. (2)

We have not created any efficiencies that can be measured to date. Our project is considered to be an investment in the future of the pile driving program. Our goal is to have the Pile Driving Analyzer used to control pile driving on projects where it's use can be beneficial. on those projects it has the potential to save the state significant money. (3)

Yes, productivity can be increased by providing user support immediately on-line, as opposed to traveling to provide on-site support (also saving travel costs). (4)

Yes, productivity can be increased by speeding up the data entry process, especially for computer novices. (5)

The dial-up access project has not created any measurable efficiencies due to its current status of non-functioning. This technology could create measurable efficiencies with the wide spread implementation of the telework concept. The saving created by a project would be measured by the reduced amount of square footage required for office space as well as opening avenues for the disabled to work in specialized environments. (6)
We have not proceeded far enough to know what the efficiencies will be. (7)

The Project had all the mechanisms in place to measure efficiencies in productivity. (8)

No. The project has been completely redirected. The original program proved to be too unwieldy. (9)

N.A. Our project is being implemented this summer. It will produce time savings and $$$$$. The question is, how much? Is the ratio large enough to offset software and hardware costs. (10)

Yes. (11)

No. (12)

Yes, up-to-date information is retrieved electronically. This eliminates need for mylars and reduces use of out-dated information. (13)

Yes. This project allowed for the access to the video log on a network (at your desk) environment. The costs could be measured by monitoring the number of access and locations to determine times that people would have had to get up and go to a location of the videolog equipment to use the system. (14)

Yes, measurable efficiencies were created as a result of our project; Documenting Traffic Flow Baseline Conditions with a Video Ground Truth Recording System.

More efficiency in collecting Vehicle Occupancy data. Fewer overtime hours expended in field data collection. Four hours of overtime per day are required to collect vehicle occupancy data per manned site. A six-lane freeway requires six data collectors. The data must be collected during peak periods of travel; 0600 to 0900 and 1500 to 1800, a 12 hour day. One person can operate the portable video system and the data can be collected in the office during regular hours. 20 hours of overtime saved per 6-lane site.
Greater efficiency in calibrating sensor amplifiers (setting the sensitivity on loop detector amplifiers). Two Electronics Technicians are required to adjust the sensitivity of a remote sensor. With the video equipment only one technician is necessary to do the job. Trouble shooting loop detector systems also requires two technicians. Using the video system for this task can also reduce man hours needed for this operation by 50 to 100%.

Absolute documentation of baseline data for the evaluation of detector/sensor performance. Traditionally, collecting, compiling, and documenting baseline data for an evaluation has been a tedious and time consuming necessity. Even though great pains are taken to ensure the integrity of baseline data, at one time or another during an evaluation the need to review baseline data collection procedures and the resultant data presents itself. With video documentation, this process has been reduced by a 50% reduction in man hours needed. (15)

As explained above, the original concept foresaw significant efficiencies. Typically, a rate audit performed in a traditional way took one full day of field personnel time to travel and collect invoices, and 2 to 4 hours for a rate clerk to audit the bills in the office. And, each audit provided information about only one trucking company's rates (of more than 2,000 intrastate trucking firms). Under the proposed concept, the invoices for audit would be mailed by the shipper so field time would be eliminated. Secondly, most shippers use more than one carrier, so it was presumed that a single audit might provide information about the rates of several trucking firms. The actual final research only provided directions for the future - no measurable results. (16)

2) Did your project encourage team work? How?

Our project did encourage team work. The bituminous office had considerable interaction and dialogue with private industry, other departments of transportation, and all the DOT district labs concerning our project in an effort to
work out the most effective way of performing asphalt analysis in Mn/DOT laboratories. (1)

Yes, in the initial planning and implementation stages. (2)

Yes, our project encouraged team work both within our Foundations Units and also with the Bridge Construction Section in the Bridge Office. As a result of introducing this new technology, we immediately began monthly meetings and have formed a special committee to explore the implementation of this new idea. (3)

Yes, users need to be able to communicate well to make efficient use of conferencing. (4)

Not applicable, it is designed for improving a process for the individual user. (5)

Due to the nature of the project, team work was not fostered. Had the project been more technically successful, teams/groups of peers would have developed to create a support structure for knowledge transfer. (6)

The MIRTS project is a Public Private Partnership and goes nowhere without teamwork. We have trouble maintaining the internal team because everyone has changed assignments or has left. (7)

Halfway through the project, teamwork was evident and encouraged. Team members were involved with arranging various vendors' demonstrations of equipment. The team determined performance specifications and were actively involved with preliminary correlation. One of the members conveyed that because of this project, this was the first time in ten years that she actually felt excited about coming to work. The monotony had disappeared for a while and she had a feeling of being a stakeholder with the Unit. (8)

Yes, this was an extremely involved software package that kept our users in close contact with one another. Methods of use were exchanged. (9)
It enhanced teamwork. Bridge has always been a pretty tight knit group. This project provided a good reason for additional cooperation between District Bridge personal, CO Bridge, other Districts, and the private sector. (10)

Yes. (11)

Yes. (12)

No. (13)

Yes, this project involved several parties in different areas and an outside vendor. (14)

Yes. Our unit was more involved with the consultant's data collection field team. Working more closely improved the quality of the consultant's product. Our unit developed closer ties with the Maintenance Unit. by allowing them the use of our equipment for sensor calibration, they were more open to lending their expertise (electronics) to our unit. (15)

Yes, the original project team was composed of Mn/DOT personnel and representatives from Department of Administration, Materials Management, and the Small Business Office at DTED. Unfortunately, the representative from DTED never attended a single meeting. The market research also brought together members of the shipping and trucking communities, some of whom continue to serve on other Mn/DOT committees. (16)

3) Did your project broaden the way we think about the business?

Our project did broaden our knowledge of asphalt analysis. We received alternative methods of analysis and alternative suggestions from outside sources. Our Breakthrough Award provided the impetus for us to do considerable in-depth thinking about our test procedures and ways to improve Mn/DOT analytical methods. (1)

It demonstrates new, environmentally compatible erosion control that is cost effective. (2)
Yes, our project broadened the way we think about the business. In our case, the business is pile driving. This new technology represents a radical change from Mn/DOT's current practice. (3)

Yes, it shows that "hands-on" support can be provided (even to multiple sites) without being physically on-site. (4)

Yes, it helps to see how methods other than using a keyboard for data entry may be used to provide a greater degree of efficiency. (5)

This project was mostly a response to the department's broadening of its perspective of business. The departmental support of telecommuting drove the inception of this project. (6)

This project is a first of a kind project and will offer us many insights into our role in private sector transportation projects. (7)

Members showed some genuine enthusiasm for the project as we entered into the early development phase. As we continued to evaluate the existing protocol, the team did broaden the way we thought about our own processes. (8)

Only in so far as how complicated and expansive the electronic component has become. The program became inefficient/obsolete before it was even completed. (9)

Not on an individual scale, but on a broad scale. It has brought a lot of people who resist change and new ways of doing things on board. (10)

Yes. (11)

Yes. (12)

Yes. It made us think about the customers needs and how to serve those needs through improved process. (13)
Yes, this project will lead to full implementation of this product on the network within several years. This project also lead us to believe that other things, such as plans, training tapes, etc. can be placed onto the network as shared data for all LAN users to access. (14)

My opinion is, that some of the people benefitting from our project were skeptical about using this technology to enhance efficiency. They may be more open to technological applications in the future. (15)

We hope so. Obviously, the original proposal if it had been implemented would have significantly changed the traditional model of transportation regulation from protecting businesses by regulating carriers, to protecting businesses by giving them the information they need to protect themselves. Even the subsequent market research that occurred attempted to identify the transportation needs of small businesses in Minnesota. Often government agencies, Mn/DOT included, form alliances with large businesses in the community. Large companies employ lots of people in one place and they have the resources to be involved, attend meetings, etc., so they are easy to partner with. Small companies however employ more people overall, but they are not well organized and don't have the resources to participate so it's easy to forget that they probably have greater needs than large companies. The example here is the alliance Mn/DOT has formed with 3M. The director of logistics at 3M is involved in several committees regarding freight issues in Mn/DOT. But frankly, 3M doesn't need help finding the best transportation rates, best mode selection, etc. 3M has logistics professionals and transportation attorneys with all the expertise they need. The market responds to companies like 3M and their needs. However, a machine shop in Owatonna, or a small parts manufacturer in Grand Rapids likely have no transportation expertise so they rely on the market, which history has shown can be inefficient and even cruel to ill-informed. Asking representatives of large companies to assist in developing transportation policies with small competitors in mind seems ill advised. With the demise of economic regulation in trucking, OMCS hopes the new logistics initiative in the department will pick-up some of the needs and roles
identified by the market research, but so far the feedback has not been encouraging. (By the way, nothing against 3M, the example is simply used to illustrate the idea of who are the customers for which we exist?) (16)

4) **Did it support collaboration? Explain.**

We did collaborate and communicate to a great extent with other agencies and private industries concerning our nuclear testing project. This collaboration produced new ways of interacting with external agencies that will be of benefit in the future. (1)

Yes, persons from various offices in Mankato district and from the Office of Environmental Services worked together to plan and implement this project. (2)

Yes, our project supported collaboration. As mentioned earlier, we have begun more open communications with the Bridge Construction Section. (3)

Yes, users will have the ability to provide support to each other. This helps to create team work, since another user with a similar problem may be able to provide the best support. (4)

Not applicable, since it is not used by the individual. (5)

This project supported collaboration to an extreme. The project initiator, Tom O'Keefe, Sydney Jensen, and I were all from different parts of the organization which typically did not interact. This project truly supported the concept of collaboration and internal boundary removal. (6)

This project is a Public Private partnership of five agencies; Mn/DOT, Met Council, and three railroads. It could happen only that way. The Railroads are competitors and can cooperate only with Public Sector involvement. The Public agencies can only address the development issues surrounding this project in cooperation with the railroads. Mn/DOT and Met Council have not been able to address the
freight issues before but this project can offer a base for developing that area of involvement. (7)

No response. (8)

Yes, a Users Group meeting was held once a year to exchange information concerning the program. Members included a national cross-section of DOTs. (9)

Yes, especially between Mn/DOT and the private sector in terms of project development direction. (10)

Yes. (11)

Yes. (12)

Other offices in the department are interested in setting up similar programs. (13)

Yes. Several parties from different functional groups were involved in this project. (14)
Yes, our unit now thinks about supportive roles in other unit's projects. Other units request the use of our equipment and offer to enhance the effectiveness of the system by acquiring additional components. (15)

The original plan did far more than the final project. The original idea was to see transportation advice as a small business assistance tool, however, with the demise of the original project it now seems likely that the research performed may not be used in any meaningful way. The issue arises from the rearrangement of responsibilities. When OMCS was responsible for economic regulation of trucking, it had a legitimate voice in logistics and freight movement issues and the research goal of the project was really to identify where we might collaborate to meet the objectives of a regulatory system that is now dismantled. Today, the only responsibility OMCS has for goods movement is safety. (16)

5) Did your project inspire cost effective innovations? Explain.
Our nuclear program did not proceed far enough to produce effective innovations. (1)

Yes, by utilizing vegetation from Mn/DOT's rights of way the cost of installing the vegetation is only in the form of labor. (2)

Yes, our project has inspired cost effective innovations. One innovation is the notion of pile restrike tests. This idea is not really new but has not been practiced much within Mn/DOT. Since our project began, we have seen an increase in the number of restrike tests on Mn/DOT pile driving projects. (3)

Yes, users realized that they can receive and provide effective help without traveling. (4)

Yes, by making the data entry process more efficient. (5)

At this time I do not think this project has inspired cost effective innovations. Here again, I would say this may be due to the incomplete/unsuccessful technical aspects of the project. Had this project come to fruition other innovations may have arisen. (6)

We do not yet know what the cost effectiveness of the project will be. We will be able to address cost effectiveness in the next stage if we proceed. (7)

No response. (8)

No. The project was truncated, then stopped. A new program of the same objective has begun. (9)

Not yet, but it is anticipated it will do so. (10)

Yes. (11)

Yes. (12)

Yes; we used software with which we could create the application in-house instead of hiring a consultant. (13)
I believe that this project, when implemented, will be a cost effective method to allow access to an important information source to managers and supervisors who have to maintain the highway operating system. (14)

Yes, but in a small way. One of the components added to the "Video Ground Truth Recording System" is a PCMCIA card that allows for direct, real time recording of loop detector to a laptop PC database. This eliminated the need for manually counting and recounting video image data and entering it into the data base. Depending on the data collector, this resultant innovation may have reduced the man hours necessary to record baseline data by up to 800%. Video images may include data from up to eight detectors. If only one detector is being evaluated, one to two hours of manual data compilation from the video image is required. (15)

N/A (see earlier comments). (16)

6) Did your project respond in a positive way to external pressures?

Our project did not respond in a totally satisfactory way to pressures. (1)

(no response (2)

Yes, our project responded well to external pressures. We have received support from upper management and from contractors. (3)

(no response 4, 6)

This project may have been broken by external pressures. The project tried to be all things to all people from its inception. This made the technical implementation very difficult. Since this project was to provide facilities for Mn/DOT staff and consultants/contractors to access the Mn/DOT infrastructure the complexity was enormous. Had we tried one for a limited customer base the project may have been more successful. The popularity of the project subject also brought out many more potential participants than we could respond to. (6)
This project responds to the external pressure of the Metro economy for improved Intermodal service, the communities around the existing sites concerned about noise and the needs of the rail industry to site new facilities. (7)

No response. (8)

No. (9)

Yes. I think we adapted and let the project evolve so that it could be executed. See BTI Program Evaluation question 1. (10)

Yes. (11)

Yes. (12)

Yes. Consultants are pleased with the new process. (13)

No. We had little external pressure. Only some suggestions from our consultant. this project was directed to benefit internal users at this time. (14)

There are few external pressures to internal evaluations and assessments. However, upon publication of these evaluations, there may be less pressure with respect to data validity with video evidence available. (15)

One of the reasons we opted to conduct market research before just plowing forward with implementation is because we were aware that private audit firms (two of the nations largest are located in MN were wary that Mn/DOT might be attempting to take over a previously private enterprise. Shippers have always had the choice of having their freight bills audited by a private firm. However, for whatever reason small companies rarely seek out such services. Maybe they just don't know who to go to, maybe they don't think it is worth the cost. So by doing a marketing plan, we wanted to devise a service that did not compete with private auditors, but complemented them. We also wanted to provide a low cost or no cost way for small shippers to get
information about their freight charges that the market place apparently fails to give them. (16)

7) **Are you on schedule? (Meeting milestones, baseline data?)**

We are not at this time on our original BTI program. Our proposed schedules were not met. (1)
Yes, the project is presently being monitored for its level of success. (2)

Yes, our project is on schedule. We had planned on evaluating the Pile Driving Analyzer for a couple of years and then to implement this new technology into our pile driving program. To date, we have been evaluating the PA for two years during which time we have performed a half dozen tests. As far as implementation, Mn/DOT is planning on using the Pile Driving Analyzer to control the pile driving for a bridge that is to be constructed in 1997 on T.H. 610 in Brooklyn Park. (3)

Project is on hold until the Soils Automation MISC position is filled. (4, 5)

This project is nowhere near its schedule. The technology implemented in this project was and still is very volatile. There are new products hitting the market all the time, updates to hardware and software happened so fast that by the time we were able to get one component functioning it was obsolete. (6)

We finished Phase I which was the basis of the Innovation application and are now in Phase II. We anticipated completing Phase II in August of 1996. It will likely be October before we complete the Phase II report. Phase III can commence to design and build the project if the necessary commitments are made and the organizational structure/financing are established. (7)

In March 1996, the project stalled. Internally the Materials Section staff had failed to assure that this project had the means to be carried on and completed. Section staff was providing little or no support for this project. (8)
No. (9)

No, but we are moving in the right direction. Data will be available by winter/early spring. (10)

No - keep expanding... moving horizon. (11)

No. (12)

Yes. It's in statewide use and performing well. (13)

We have completed our project. (14)

No. My original work plan was not realistic. There were many delays in the acquisition of required equipment. The development of a working system also required a great deal more time than allocated. (15)

N/A anymore. (16)

8) Would you have gone through with this project w/o BTI money?

Our project would have been on a smaller scale and we would not have involved all Mn/DOT districts. (1)

No, the Office of Environmental Services does not have the funding for such a project. The only way this project could have been funded is if Mankato district had money from federal funds for flood relief/damage. (2)

Yes, we would have proceeded with our project without BTI money, however, we most likely would have waited several years longer to begin. (3)

Probably not. (4, 5)

In all honesty, I don't think we would have gone through with the project without BTI monies. This project may have been ahead of its time. (6)

Money had to be found, we probably would have found some but it would have been harder. We did struggle with the start
up timing and the expiration of the funds at the end of the 
year. These projects do not fit nicely into our annual 
budget process. (7)

No response. (8)

Yes. (9)

Probably, in some form. We are talking about application of 
 improved and changing technology. To continue to compete, 
 Mn/DOT has to invest. (10)

No. (11)

No. (12)

Maybe. We found out that it would be cheaper than we 
thought only after we had received the BTI money, so it's 
hard to say. (13)

No. Resources are always the problem, especially funding if 
we can use consultants. (14)

No!!! The available scientific equipment budget could not 
have withstood the onset of such a project as ours. Funding 
for operations is the first priority. Money for evaluations 
would have been expended on consultants rather than to 
enhance data collection and analysis capabilities in-house. 
(15)

That is a difficult question to assess. About the time our 
project was starting, Lee Brady and Carla Rains were hired 
and the department's market research program initiated. Lee 
actually participated on the steering group for the project, 
so in this particular instance it might have occurred 
through that process. however, I doubt we would have been 
able to fund it out of our own office budget. (16)

Other Comments

Some additional comments I would like to make regarding the BTI 
program and my project specifically. I think the program needs 

B21
to be marketed more aggressively if it continues. Solicitation for projects needs to be an on-going effort. Solicitation once or twice a year may not be sufficient when those with the innovative ideas may "lose their inspiration".

My project, actually the project I inherited from Sydney Jensen who inherited it from tom O'Keefe, was truly innovative. The need for this service has been elevated to the point where the departmental IRM Planning and Modeling Projects have identified a full scale project to implement or buy this service to satisfy our growing communications needs. As I noted earlier, this project may have been 18-24 months too early.

The last point I would like to emphasize is that there needs to be a better understanding of where the BTI program fits the organization. It needs to be made clear that the program is not just another funding source and great care needs to be taken when dealing with information technology BTI project proposals.

Thank you for the opportunity to provide feedback to the BTI program. I look forward to see the results of your survey. (6)
RESPONDENTS

1. Keith Englesby
2. Lori Belz
3. Rich Lamb
4. Sandy Netland
5. Sandy Netland
6. Al Johnson
7. Cecil Selness
8. Dave Linell
9. Daniel Prather
10. Steven Kirsch
11. Marj Ebensteiner
12. Marj Ebensteiner
13. Jim Pierce
14. Keith Slater
15. Len Palek
16. Mark Berndt

Note: Gordon Hoff also responded to a phone survey.

July 1, 1996, updated August 1, 2, 15 1996.
BREAKTHROUGH INNOVATION (BI) PROGRAM EVALUATION

1) In your opinion, what are the successes (or failures) of the BTI program?

2) The BTI program started as a response to "left-over" money at the end of the fiscal year, should BTI be a regular, continuing, funded program? Why?

   Yes 87.5%    No 6%    No response 6%

YOUR PROJECT EVALUATION

1) Did your project create efficiencies that can be measured? Specify. (Produce significant and measurable increases in productivity) (Measurable in time saved or $$$ and incorporate a mechanism to do so)

   Yes 37.5%    No 37.5%    Other 25%

2) Did your project encourage team work? How?

   Yes 81%    No 12.5%    Other 6%

3) Did your project broaden the way we think about the business?

   Yes 87.5%    No 12.5%

4) Did it support collaboration? Explain.

   Yes 87.5%    Other/No response 12.5%

5) Did your project inspire cost effective innovations?

   Yes 50%    No 6%    Other 44%

6) Did your project respond in a positive way to external pressures?

   Yes 37.5%    No 25%    Other 37.5%

7) Are you on schedule? (Meeting milestones, baseline data?)

   Yes 18%    No 50%    Other 32%

8) Would you have gone through with this project w/o BI money?

   Yes 31%    No 56%    Other 12%
APPENDIX D

BREAKTHROUGH INNOVATION PROGRAM PROJECTS
## BREAKTHROUGH INNOVATION PROGRAM PROJECTS

<table>
<thead>
<tr>
<th>PROJECT</th>
<th>RESPONSIBLE PEOPLE</th>
<th>DOLLAR AMOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY 94 Understanding the Impact of Federal Preemption of Intra-state Motor Carriers on the Shipping Community</td>
<td>Mark Berndt</td>
<td>$47,400</td>
</tr>
<tr>
<td>FY 94 Interactive Travel Information System (ITIS)</td>
<td>Marj Ebensteiner</td>
<td>$100,000</td>
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<td>FY 94 Bridge Inspection Utilizing an Electronic Notepad for Recording Information</td>
<td>Steve Kirsch</td>
<td>$20,000</td>
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<td>FY 94 Remote Access to Mn/DOT's Information Networks</td>
<td>Al Johnson</td>
<td>$82,500</td>
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<tr>
<td>FY 94 Dynamic Pile Driving Analysis Using the Pile Driving Analyzer</td>
<td>Gary Person</td>
<td>$70,000</td>
</tr>
<tr>
<td>FY 94 Interfacing Photolog Video into Local Area Network (LAN)</td>
<td>Keith Slater</td>
<td>$50,000</td>
</tr>
<tr>
<td>FY 94 Nuclear Asphalt Gauges</td>
<td>Dan Wegman</td>
<td>$32,400</td>
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<td>FY 95 Using Desktop Conferencing Software to Provide Real Time PC to PC Interaction. (Statewide Soils Automation Effort)</td>
<td>Sandy Netland</td>
<td>$3,000</td>
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<tr>
<td>FY 95 Collection of Field Soils Data Using Bar Code Readers</td>
<td>Sandy Netland</td>
<td>$1,500</td>
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<tr>
<td>FY 95 Integration of Bridge Design System (BDS)</td>
<td>Dan Prather (Pl)</td>
<td>$29,000</td>
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<tr>
<td>FY 95 Automated Bridge Standards Retrieval and Transmission System</td>
<td>Rod Koehn (RC)</td>
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<tr>
<td>FY 95 Collection and Documentation of Traffic Flow Baseline Conditions</td>
<td>Len Palek</td>
<td>$44,524</td>
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<tr>
<td>FY 95 Conversion of Aviation Education Printed Material Into a Machine Readable Format</td>
<td>Gordon Hoff</td>
<td>$22,000</td>
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<tr>
<td>FY 95 Establishment of a High Speed Communications Link Between the St. Croix Scale and the Office of Motor Carrier Services</td>
<td>Chris Conway (Pl)</td>
<td>$14,000</td>
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<tr>
<td>FY 95 Changing the Administration Process for Railroad Grade Crossing Safety Improvements</td>
<td>Mark Berndt (RC)</td>
<td></td>
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<tr>
<td>FY 95 The Use of Bioengineering to Stabilize Steep Roadside Slopes</td>
<td>Lori Belz</td>
<td>$50,000</td>
</tr>
<tr>
<td>FY 95 Development of a Road and Weather Network Demonstration Project</td>
<td>Marj Ebensteiner</td>
<td>$50,000</td>
</tr>
<tr>
<td>FY 95 Soils Particle Size Distributions Using Laser Technology</td>
<td>Dave Linell</td>
<td>$50,000</td>
</tr>
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