

Facilitating Transportation Agency Management Through Performance Measurement: The NYSDOT Experience with the "Management Performance Indicators" Report

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Performance measurement is a powerful management tool to help an organization accomplish its mission and build a more productive work environment. This paper describes steps undertaken by the New York State Department of Transportation (NYSDOT) to develop an executive-level performance measurement system—the "Management Performance Indicators" report (MPI). It was developed to meet executive management information needs, but over time has evolved into a tool for monitoring and assessing departmental performance. Its development and evolution are explored, as well as benefits derived from its use. Components of the MPI are surveyed, as well as lessons learned in its use and its future within the agency. The MPI is a management resource for NYSDOT, providing early warning of potential problems and allowing modification of processes to improve performance. Longevity and continued success of the MPI are based on its flexibility, ability to hold the interest of top management, and the atmosphere of cooperation it encourages among program areas. Executive focus on program areas identified by the MPI has improved the department's productivity in numerous program areas. Its introduction has also fostered development of more reliable data and a team spirit among managers to address potential areas of concern. A performance measurement system benefits all levels and all functions of an organization. Usefulness of an executive-level MPI can be expanded through extension of performance measurement into all NYSDOT areas.

Measurement and evaluation are important management tools for monitoring performance of programs. They take place on all levels and across all functions on a continuous basis. Performance measurement can help accomplish an organization's goals, and at the same time build a productive work environment. Private industries have used performance measurement systems to facilitate improvements of existing corporate or divisional reporting systems; enhance communication links, enabling managers to stay in tune with critical activities in the organization; and improve program management capabilities. The need to improve performance and enhance communication exists in the public sector just as it does in private sector corporations.

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OVERVIEW

What Is the MPI?

The New York State Department of Transportation (NYSDOT) staff created the "Management Performance Indicators" report (the MPI) to provide upper-level managers with current information and specific data on the performance of major processes. It has met three primary objectives identified by NYSDOT's executive managers:

1. It should provide a continuous view of how NYSDOT is performing as an organization,
2. It should help managers identify potential problem areas earlier, and
3. It should strengthen communication among department managers.

Advantages and Benefits of the MPI

A periodic report such as the MPI has many important advantages:

1. Executive management regularly receives reports and analysis on the progress of important programs so they can direct corrective action and/or provide positive feedback,
2. Program managers have more incentive to try to improve their performance because they are being reviewed,
3. The data used to monitor program performance becomes more reliable because it is being monitored by executive management,
4. Where information is not available, reporting "pushes" development of data systems to assist management in monitoring critical processes, and
5. A baseline is established for historical performance of key performance measures.

Why Was It Created?

In 1985, NYSDOT began moving its management culture toward greater use of operational planning and goal-oriented management to improve performance and manage resources more effectively.

These initiatives, however, required performance indicators and data to measure achievement of goals and plans. When a new commissioner of Transportation began his tenure at NYSDOT in 1986, he discovered that executive management could not review current NYSDOT performance in a single document. Individual reports and staff briefings were available, but it was difficult to synthesize the flood of information from NYSDOT's many programs to understand how NYSDOT was doing in areas of greatest concern. To solve this problem, the Management Systems Bureau (MSB) was asked to develop a prototype—the "MPI," or Management Performance Indicators report.

How Was It Created?

MSB had been established within the department as "internal" management consultants, and was ideally positioned to develop the MPI. MSB's work includes policy analysis, organizational assessments, systems analysis, and quantitative analysis. These activities put them in close contact with department management as well as provided them with an opportunity to become familiar with departmental operations.

The first step was to develop a list of potential measures representing key indicators (in the joint opinion of each organization and MSB) for NYSDOT's major activities. To assist in this effort, MSB staff reviewed department reports and statistics and searched the literature. MSB's familiarity with program area activities as well as the often excellent rapport its staff had established (through previous assignments) went a long way in breaking down any barriers between the commissioner's staff and program staffs that might have created reluctance on the part of program managers.

Unfortunately, most of the measures initially identified indicated results (e.g., how many bridges were designed or traffic signals installed) but did not indicate efficiency or effectiveness. Although helpful, such indicators do not tell how well an organization delivers its key products and services.

The literature search found that only a few other transportation organizations were producing performance reports. Most were project-related, reporting on the status of individual projects, then "rolling them up" into summary reports. These are certainly useful, but measure only parts of an agency's performance.

The result of this joint effort with various program managers was a list of nearly 100 possible measures covering virtually every departmental service and product. Obviously, these were far too many for an executive report. After several meetings, the commissioner and staff selected 15 measures to be developed and reviewed—5 to be reported quarterly and 10 monthly. Indicators may be reported either monthly or quarterly, depending on rate of change or cyclical nature of the data.

The decision to limit the number of measures was based on management preference, reasonableness of the number to be analyzed, and amount of MSB staff time available to develop the report. This required two staff members to work half-time for 9 months to identify potential indicators, and to work with executive managers to select specific measures to be included in the report. It then required one person full-time and another person quarter-time over a 3-month period to work with program area staff translating the indicator ideas into actual performance measures. Currently, the MPI requires one person half-time to maintain and enhance the report, plus another person quarter-time to produce it.

Issues in Its Development

✓ Circulation was restricted, at least initially, to key department executives. It was uncertain what such a report would reveal or how it might be used outside the department.

The first reports were internal working documents, distributed to key department managers. They provided the basis for discussion among executive staff to identify and focus management efforts on areas of greatest concern. The key indicators were viewed as preliminary, based on available data. It was anticipated that data accuracy and reliability would improve over time. As will be described, this proved to be a critical success factor for the report's longevity and acceptance.

THE MPI TODAY

How It Is Prepared

The Monthly Report

An MSB team of analysts prepares the MPI each month, receiving data from various staff members responsible for the activities measured in the report. Typically, the MPI team prepares the graphs and tables that are the basis of the analysis. The format for presentation of performance indicators has been standardized for consistency and easy comprehension. This format includes: 1) a detailed description of each measure, 2) an explanation of impact of the performance of the indicator, 3) the data source, 4) the goal (target), if any, 5) a trend analysis, and 6) data presentation in both tabular and graphic formats. A typical MPI report is represented in Figure 1. ✓

The team's analysis for each indicator usually consists of one to two pages and includes historical trends, comparisons among regions, and comparisons of performance to an administratively set goal or standard. (NYSDOT has 11 administrative-geographical "regions.")

New Indicators

The consensus-building process previously described in the MPI's development continues today as new indicators are identified and developed. The MPI team, in conjunction with program personnel, produces a package for each indicator containing graphs, tables, and narrative that highlight trends and developments. This package is then discussed and reviewed with program area managers.

If agreement is reached, the package is forwarded to the program's assistant commissioner and/or the regional director(s) for final approval. Once final approval is obtained, the indicator becomes part of the MPI report. When data is unavailable for developing an indicator, the MPI team sometimes works with the program area to develop a supporting data system.

How It Has Changed

✓ In 1993, another new commissioner of Transportation was appointed. After being briefed on the report and hearing comments

TITLE: Orders-On-Contract**FREQUENCY:** Monthly**DESCRIPTION:**

The following graph and table report on the level of orders-on-contracts received for construction contracts that have been completed over the last twelve months. The graph presents the final amount paid for a contract as a percentage over or under the original bid price, for all contracts in a Region.

Since the February 1993 MPI, this indicator has included only construction contracts which have been completed. Comparisons to prior MPI's, which include canceled construction contracts and emergency/contingency contracts (where bid amount and final amount may bear little relation to each other), are invalid.

IMPACT: Positive percentages indicate that, on average, projects cost more than the awarded amount. Negative percentages indicate that, on average, final costs were lower than the awarded amount. Ideally, there should be no difference between the awarded amount and the final project cost. However, in the construction industry, orders-on-contract in the range of two to four percent are considered acceptable depending on the nature and type of work.

SOURCE: Construction Division

TREND: Contracts Closed:

In a typical MPI, the current month's performance is compared to the prior month and the prior year performance. Both statewide and regional performance is analyzed. Occasionally, the MPI will include a long-term analysis.

FIGURE 1 Typical MPI report; table and bar graph show hypothetical data. (continued)

from program staff, he readily agreed to continue the MPI. He did, however, make one significant change: the report is now widely distributed throughout the department (to both the main office and regions). This decision has brought immediate benefits. Mid-level managers are now actively involved in analysis of these measures and many use them in their day-to-day work. The indicators are regularly discussed, as well as causes for particular trends. There is also spirited but friendly competition among regional groups as to their "standings."

With expanded distribution of the MPI, opportunities occurred to ask users directly what changes they would like to see. In January 1994, MSB distributed a survey to improve usefulness of the MPI. This was the first time since the report began in 1989 that recipients were asked directly for their input. Comments were requested on each component (analysis, tables, graphs) for the current indicators (both monthly and quarterly). Recipients were encouraged to offer comments, suggestions, and alternative measures of assessing NYSDOT performance. Using survey results as a base, discussions were held with executive managers. The result was a work program to "fine-tune" current indicators, develop additional ones, and discontinue others to better reflect the changing needs of NYSDOT managers. The MPI reader survey produced the following top-rated new indicators.

1. Summary of the current letting program with respect to miles of roads and number of bridges to be constructed or rehabilitated (planned versus actual).
2. Report on the department's ability to accurately assess construction costs.
3. Report on the department's ongoing highway and bridge maintenance program (planned versus actual).
4. Report on recruitment and promotion of women and minorities within the department.
5. Report analyzing the cost of producing the Capital Program.

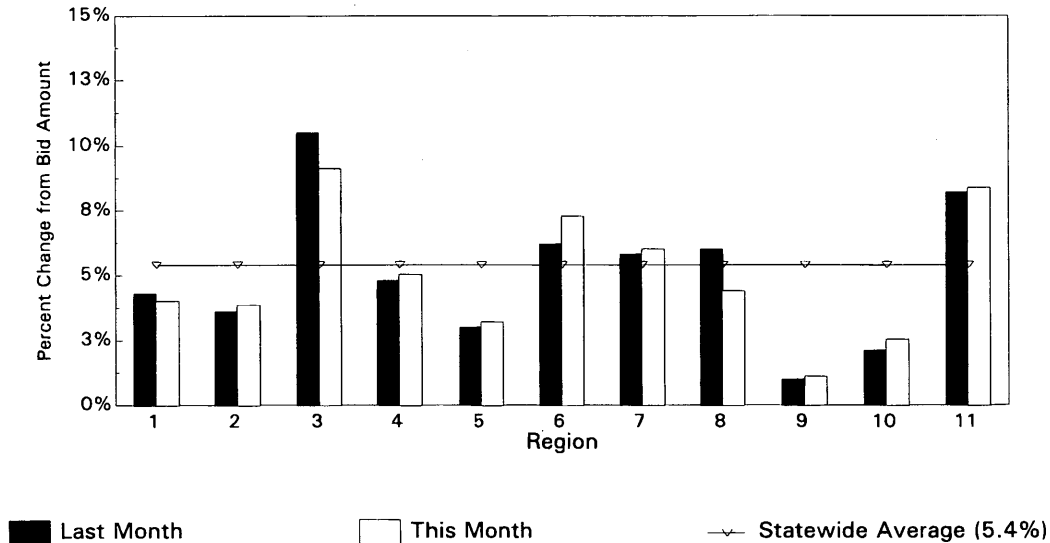
The MPI team plans to ask readers periodically for their feedback to ensure that the report will maintain its relevancy and usefulness.

The MPI Today: What It Contains

The MPI format corresponds to NYSDOT's major functions. It presents data and analysis of key activities in the NYSDOT capital program: project scoping, design, and construction; project cost estimating; obligation and disbursement of funds; administrative support; and specific areas of executive interest.

When warranted, MSB develops and includes special indicators on a time-limited basis to track performance of activities having

Orders-On-Contract Contracts Closed from 4/93 to 3/94



ORDERS-ON-CONTRACT CONTRACTS CLOSED (4/01/93 to 3/31/94)

Region	Award Amount (Millions)	Final Amount (Millions)	Final/Award
1	\$37.4	\$38.9	4.0%
2	\$59.7	\$62.0	3.9%
3	\$51.6	\$56.3	9.1%
4	\$43.7	\$45.9	5.0%
5	\$74.8	\$77.2	3.2%
6	\$35.8	\$38.4	7.3%
7	\$25.0	\$26.5	6.0%
8	\$120.5	\$125.8	4.4%
9	\$36.5	\$36.9	1.1%
10	\$161.8	\$165.9	2.5%
11	\$263.8	\$285.9	8.4%
Total	\$910.6	\$959.7	5.4%

Source: Construction Division

FIGURE 1 (continued)

high levels of executive or program interest. For example, in April 1988, the department accelerated efforts to recruit and hire entry-level engineers and to expand affirmative action efforts for these titles. The goal was to recruit the most qualified entry-level engineers while accelerating the process of diversifying NYSDOT's engineering forces. This indicator summarized the results of NYSDOT's efforts in accomplishing the established goal, and was dropped from the report when the goal had been achieved. ✓

The following discussion describes each current indicator in the MPI. As previously noted, indicators are reported either monthly or quarterly, depending on the rate of change or cyclical nature of the data.

Capital Program Management: Letting Program Indicators

The *Letting Program* measures NYSDOT's progress in obligating federal aid and state aid funds during the current fiscal year. Monthly and cumulative performance is measured against quarterly and fiscal year targets. This information is aggregated on a statewide basis and also presented by region.

Letting-to-Award Processing measures NYSDOT's efficiency in awarding construction contracts. It reports the percent of contracts that progressed from acceptance of bid to contract award within a department standard period of 46 days. It also presents information

on the median number of days required to process a contract, and the longest and shortest processing times.

Capital Program Management: Project Development Indicators

Status of Project Development: 5-Year Program measures the department's progress in predesign (planning) and preconstruction project development for all projects scheduled to be let in the current 5-year capital construction program. It compares actual project development elapsed time against the most recent target schedules. Projects are represented in one of six phases of development: not yet begun, scoping, preliminary design, final design, submission of plans specifications and estimates, and let.

Status of Project Development: Current Fiscal Year measures the department's overall progress in project development for the current state fiscal year. Information on the number and current estimated value of projects in the scheduled phase of development is compared to the actual phase of project development. The indicator tracks the percentage of the program on schedule, which ultimately allows NYSDOT to meet its annual letting target.

Project Cost History measures NYSDOT's ability in accurately estimating construction costs of capital projects as they progress through the development process. Initial cost estimates established at the beginning of project scoping are compared to final cost estimates contained in engineers' estimates at the end of the detailed design process. Accuracy of the estimates is an important factor in the department's ability to manage its 5-year Capital Program. This indicator is analyzed by project type and region. Currently, the Project Cost History Indicator is being modified to reflect feedback from the MPI reader survey. Managers responded that a more accurate measure would compare project cost estimates at several points in the design process.

Capital Program Management: Construction Program Indicators

Construction Schedule measures NYSDOT and contractor effectiveness in meeting construction completion targets. A contract is defined as "on-time" if it is completed (i.e., the contractor's last day of work occurred) on or before the completion date specified in the original (awarded) contract. This indicator presents the number and value of construction projects scheduled for completion in the most recent 12-month period, and the percent and dollar value that were completed on schedule.

Orders-on-Contract reports the level of change orders received for construction contracts completed over the last 12 months, and information on change orders approved or being processed for all construction contracts under way at this time. Performance is compared within regions and by the department over time and against customary construction industry standards.

Real Estate Acquisition presents data on NYSDOT's performance in making payments to property owners affected by right-of-way activity on federal aid projects. Federal law requires that the state either pay the property owner the full amount of appraisal, or deposit the amount of the state's offer in an interest-bearing account before the project's award date. This indicator compares NYSDOT's performance against a goal of 100 percent payment.

Administrative and Financial Indicators

Consultant Contracts Processing measures NYSDOT's efficiency in the processing of consultant contracts for bridge and highway design or construction inspection. This process consists of five steps: designation (selection), price and scope negotiation, draft of contract agreement, funding, and contract approval. This indicator reports the median number of days required for each step and compares these medians to NYSDOT's standard for each step. The department is moving to "just-in-time" processing, which delivers the contract on a date requested instead of within a standard time frame. When this shift is completed, this indicator will be revised to report the percentage of contracts delivered by the requested date.

Internal Affirmative Action Goal Attainment measures the department's performance in attaining its affirmative action hiring goals. Overall targets are set for each region and the main office, and their performance results are reported. At the commissioner's request, MSB has expanded this indicator to report on progress in improving the status of women and minorities in the department (i.e., hires and promotions).

Disadvantaged Business Enterprise (DBE) indicators measure NYSDOT's ability to meet federal and state goals for use of DBE and MBE (Minority Business Enterprise) construction contractors, subcontractors, and consultants. They report the percent of construction contract funds awarded to firms owned by one or more socially and/or economically disadvantaged persons (minorities, women, and/or other disadvantaged persons.) Both the federally assisted and state-funded programs are monitored. Participation goals have been established for contractors and subcontractors, and the department's performance is measured against these goals. The department is currently establishing goals for consultant participation.

General Fund Disbursements: State Operations and Local Assistance Accounts measure NYSDOT's ability to manage accounts for State Operations and Aid to Localities. The department's projected and actual cumulative disbursements are compared. If actual disbursements are much greater than projected, NYSDOT may risk exceeding its limit and may require additional disbursement approval from the State Division of the Budget to fund operations. If actual disbursements are much lower than those projected, NYSDOT may risk reduced appropriations in future fiscal years.

Current Areas of Executive Interest

Public Claims and Tort Liability measures NYSDOT's ability to manage its liability for actions (and nonactions) relative to its highway programs. This indicator presents data on claims filed against the department by the public for alleged departmental torts (e.g., negligence in design, maintenance, etc.). The indicator also reports the number and value of torts closed and identifies whether they have been dismissed, discontinued, awarded funds, or settled.

Departmental Safety measures managers' and employees' ability to adhere to safety rules as measured by the number of personal injuries, vehicle accidents, and lost-time days reported during the current calendar year. These figures are reported on a regional basis for departmental employees. Both preventable and total number of personal injuries and vehicle accidents are reported. This indicator was recently revised and enhanced based on the feedback obtained through the MPI reader survey. Lost-time days were added to the measure.

MPI SUCCESS AND LONGEVITY

Success

Reports alone do not improve performance, but the MPI report has had an impact on how the department monitors programs and measures performance. Before the MPI's existence, program managers did not universally and consistently share, discuss, and examine their data; executive managers did not have regular performance information in an easy-to-understand format; and performance was not generally compared to targets or historical data. Because of the MPI, the following events now occur.

- Executive managers hold regular monthly meetings focusing on program areas of interest, and program managers consequently are actively involved in improving and clarifying their data.
- Program data is regularly examined by a team of analysts who are not directly involved in program area work, providing a valuable "outsider's" view and a quality assurance function. As a result, data systems and reporting have improved. For example, the MPI recently added a new indicator for "Letting Program Accomplishments," which reports the number of bridges and lane miles that will be reconstructed or rehabilitated as a result of capital projects let in the current state fiscal year, and compares these figures to goals set earlier in the year. When this indicator first appeared, some regions had yet to report information for their lettings. When they realized that executive management was reviewing this information, this important data quickly began appearing.
- Executive managers now have a single source for much important information readily available (and in an easy-to-understand format) to provide the public and outside control agencies with information on exceptional and/or improved performance, achievement of goals, and areas where action is being taken for improvement. For example, in 1987, 405 days was the median required for processing of a consultant contract. After review and modification, the median processing time fell to 217 days in 1993. Similarly, during calendar year 1990, NYSDOT staff had 585 preventable personal injuries. With implementation of a state-wide training initiative and management emphasis on prevention, these declined to 436 by 1993.
- Perhaps the greatest success of the report is in opening a two-way dialogue between executive management and program areas. Attitudes of the program managers have changed from hesitation and reluctance to readiness to suggest their own indicators for inclusion in the report. The Real Estate Acquisition indicator discussed earlier is an example of an indicator suggested for inclusion from the program area.

As knowledge and acceptance of the report expand, and the base of historical information grows, optimism increases about the future of the report and continued successes such as those described above.

Longevity

The longevity and continued success of the report are due to the following four significant factors.

Ensuring Flexibility and Relevance

Virtually every measure has evolved since it was originally developed to better reflect the true circumstances yielding the indicated

results. NYSDOT's experience has indicated that even the most straightforward indicators must be carefully developed and revised to present a truer picture of the activity measured. For example, the Construction Schedule indicator originally did not take into account the seasonal nature of construction. Data presentation was revised to consider this factor.

Indicators that are no longer relevant are discontinued. For example, the MPI included an interstate pavement striping indicator to monitor regional performance in meeting goals to convert 4-in. striping to 6-in. pavement striping. The indicator was discontinued at completion of a 3-year conversion program.

✓Continued Interest from Top Management

As mentioned earlier, each month the executive assistant to the commissioner selects a measure to discuss at the executive staff meeting. Although this measure is often selected because of an unusual trend (in either a positive or negative direction), great care is taken to ensure that every measure is periodically discussed at the executive staff meeting. In this way, every measure receives attention, and continued program interest is encouraged.

Close Coordination between MSB and the Organization Responsible for the Activity Being Measured

This includes joint development or revision of the measure, prior program manager review of the analysis to be included in the report, and joint development of all presentations to executive management. In instances of disagreement over interpretation of results, every effort is made to reconcile the differing views. In the rare instances when that is not possible, the program manager's dissenting analysis is also included in the presentation. This combination of close and regular contact creates a bond of trust tending to alleviate apprehension that can often exist in such a reporting system. As a result, people can more quickly address the message, instead of arguing with or criticizing the messenger.

MPI Discussions at Executive Staff Meetings Focus on Problems, Not People

Because program managers have "bought into" the measures and because they know the measurements, open discussion of issues raised by the MPI lose any accusatory, inquisitorial edge. Executives can more quickly identify reasons for trends, what managers are doing to address them, future prospects, and what NYSDOT responses are needed.

LESSONS LEARNED AND FUTURE ACTIONS

Observations and Opportunities

Over the years, performance measurement has gradually expanded into the lower levels of NYSDOT's organization. Some managers embraced performance measurement wholeheartedly, even before introduction of the MPI. Unfortunately, use of performance measurement as a management tool is not universal. In part, this may be because of the difficulty of measuring some activities. In other

instances, it may simply be a case of a manager being uncomfortable with the tool. Another factor may be unintentional messages presented by an executive report. If performance for a particular program area is not measured, it is sometimes wrongly perceived that this program is not important. To address this misconception, the department may ask all organizations to develop and maintain their own key indicators and highlight appropriate indicators in the executive report on a rotating basis.

The department also struggles with the issue of how to measure more difficult areas such as planning. Delivery of required plans and systems on time and within estimated resources has been the focus to date, but has produced only limited success. A new indicator under development measures the Preliminary Engineering (PE) costs for construction projects. One component of this PE cost is planning. NYSDOT has begun reporting on the level of planning effort expended by project type and by region. This is a first step in establishing a benchmark concerning planning levels for construction projects.

As ability to understand the usefulness and importance of performance measurement expands, the focus of the measures sometimes changes. NYSDOT's performance measures generally concentrate on output (volumes and costs), but an effort to measure quality has begun in several activities. An example of this effort is the Real Estate Acquisitions indicator, reporting on NYSDOT's performance in making payments to property owners affected by right-of-way activities. This measure addresses the quality of NYSDOT's performance, because the "customer" is clearly more satisfied if paid before the start of a construction project.

What Has NYSDOT Learned?

Through development and refinement of the MPI, NYSDOT has learned several points about performance measurements:

- Close involvement of program staff is essential in developing, modifying, and interpreting data. Data are only useful if they help staff identify their own opportunities to improve. Those closest to the data must be actively involved.
- Performance should be measured as a means to identify opportunities to improve it, instead of a means to assign blame for apparently poor performance. The experience, knowledge, and data gained from this effort should be shared throughout the organization.

- Managers should resist the temptation to enlarge the report; 15 to 20 measures is an optimal number. As new indicators are needed, managers should expect to drop those that are less revealing. If an agency believes it needs more measures, it could report on some other measures less frequently.

- Because of management principles in general and the MPI success in particular, organizations within a transportation agency (e.g., offices, divisions, districts, and regions) should have their own MPI reports.

- The process is dynamic. Virtually every MSB indicator has been modified to reflect MSB's improved understanding of issues and associated problems. This continuous improvement is consistent with the department's management culture.

- Some measures simply do not fulfill their expectations and should be dropped. Staff should use the technical and analytical experience gained from each measure for continuous improvement of other existing measures or develop better future measures.

- One last comment: managers get what they measure. Staff tend to focus on particular areas to the detriment of others. Select performance measures carefully and be sure that all critical program areas get attention.

It is important to remember that performance measurement is not an end in itself, but rather a management tool that helps an organization accomplish its mission and build a more productive work environment. As such, measures should meet needs of the organization's managers, and provide the information needed to improve and monitor their programs. MSB continues to refine and enhance the MPI to reflect executive interests.

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As mentioned in the paper, the MPI is an evolving document and NYSDOT continuously seeks to improve the usefulness of this management tool. The authors would also be interested in speaking or corresponding with individuals or organizations that have had experience with management performance measurement systems.

Readers who would like more information on NYSDOT's MPI Reader Survey should contact the authors at:

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