Managing Traffic Records Systems Through Management Information Systems

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ABSTRACT

Traditionally, traffic records systems have been defined as management information systems for highway safety programming. In fact, they are also massive operating systems concerned with products, revenue collection, and record maintenance. Highway safety management information is often a secondary concern. Managing these operating systems requires smaller management information systems whose data serve to support, control, define, and analyze the operations of the major traffic records systems. Although these smaller management information systems have not been traditionally thought of within the context of the traffic records system, their success or failure may have consequences for the success or failure of the traffic records system and the entire highway safety programming effort. These small support systems serve to ensure the timely creation and updating of the traffic records systems with quality data. They also serve to ensure performance of basic functions, thereby permitting greater management time and attention to highway safety programming.

Traffic records have traditionally been described as record keeping systems for driver, vehicle, roadway and environment, and accident data. Perhaps even more so, the accident records system has generally been held to be the traffic records system.

In concept, a traffic records system is the management information system (MIS) dedicated to highway safety. In reality, however, traffic records systems, at least the major subsystems of the driver and vehicle, are large extensive processing, production, and revenue collection systems that operate in addition to the highway safety programming uses. In fact, their use as highway safety systems can be secondary, particularly in the case of the vehicle file, to that of revenue collection and other purposes.

The driver and vehicle systems contain millions of records and are extremely dynamic. The ability to quickly create and update these records with quality data is a prime determinant of the value of a state traffic records system.

Pennsylvania has approximately 7.5 million vehicles with a total active vehicle registration file of 13 million records. On any given work day, an average of 44,000 paid transactions are processed against that file. Several thousand additional free transactions are also processed, particularly change of addresses.

The Pennsylvania driver license file contains 7.25 million drivers, while the number of active records on file is approximately 8.8 million. Some 40,000 driver licenses, new and renewed, are produced and 20,000 citations and suspension actions are taken each week. By contrast, Pennsylvania's accident record system creates 130,000 records a year and 500 records daily. Altogether, the active accident record file is about 550,000 records. And even though this system is Pennsylvania's most sophisticated traffic records system, it still has performance standards for its managers that are productivity oriented in an operational sense.

Thus to view traffic records systems solely within the context of providing highway safety data is to really miss the mark by a fair margin.

If the operating systems work and work well, there is a reasonable chance that an integrated traffic records system will pay off on its investment. If the operating system does not work well, budget dollars are going not to an integrated traffic record MIS but instead are going into propping up the operating systems because they interface directly with the motoring public. Because of that, they are never allowed to fail.

To illustrate that point, in 1970 Pennsylvania had no accident record system, even though a computerized accident record system had been operational since 1966. The entire Bureau of Accident Analysis, which operated the accident record system, was shifted lock, stock, and barrel to assist the faltering vehicle registration system that year.

Although the driver, vehicle, and accident record systems are massive and complex, managing the day-to-day operation of these data factories requires smaller MISs, whose data serve to support, control, analyze, and direct. (The roadway information system, which is a vital part of the traffic records system, is excluded from this discussion in order to concentrate only on the driver and vehicle systems.)

Previously, many of these MISs were in reality management reporting systems; that is, how many widgets or transactions were produced. In Pennsylvania the registration of vehicles and the licensing of drivers began in 1906; since then a few documents have been lost in file drawers only to be recovered later and treasured as historical documents. Among these papers are different reports used over the years. They all are of the management reporting variety. Those types of reporting systems remain and in fact were the MISs until 1979. Many published accident statistics are little better than reporting mass arrays of data by frequency and type.

An MIS is no substitute for management; rather it is a tool. It is immaterial whether the MIS is computerized or not. What is material is the relevance of what it measures, the relevance of the data it collects and manipulates. This holds true for the traffic records system as well.

MISs are to report the exception and prove the general rule or standard. For example, the Bureau of Traffic Safety wants a specific population of repeat offenders to be defined. In addition to defining the parameters of that group, the Bureau needs demographics from the files for that population because they are an exception. Likewise, for statistical quality control, the Bureau wants to know when the process is within standard or tolerance and when a process is out of control before it goes beyond a set tolerance.

Whether needing data on recidivism rates for school bus violations, suspensions, or the time to produce a driver's license, the principles for an MIS remain the same:

1. Know what needs to be measured,
2. Set up a collection and reporting system, and
3. Collect the pertinent data.

Oftentimes the order is reversed. The data that are available are reported, not the data that are needed.

Beginning in 1979 at the Pennsylvania Department of Transportation (PennDOT), department-wide reporting began as part of a management-by-objectives program. How much was produced was not a relevant measure of performance because PennDOT had a captive market and it was not relevant to the level of service provided to its customers. Because the Department could not or should not license any more drivers than were eligible, it concentrated on how well the licensing functions were performed. What also became relevant was the cost of operating those systems, particularly in terms of staffing.

To better understand how these subsystem MISs are used to run PennDOT's main operating systems, three examples are discussed.

TURNAROUND TIME REPORTING

Pennsylvania's traffic records systems are fairly unique, at least in one aspect. Although as a general rule accident record systems are centralized, driver and vehicle license issuance throughout the rest of the United States tends to be decentralized. In Pennsylvania, however, all processing and issuance is centralized in Harrisburg. The only transactions done outside of Harrisburg are those for temporary license plates, which are available from dealers, and taking the photograph for driver licenses. All products are produced in Harrisburg and either sent back to Pennsylvania motorists through the mail or by registered messenger services. Thus the time it takes to produce a given product is an important indicator of performance. From a traffic records point of view, it is just as important to be timely in creating and updating records. Over the past 4 years a series of small MISs have been developed and implemented to measure the length of time it takes to complete a given process. These MISs are fairly simple but have a high degree of relevance in terms of system management for performance.

By December 1980 turnaround times were measured for the four major product lines: titles and vehicle registrations, driver licenses, registration renewals, and driver license renewals. At first the systems were extremely simple, with data being extracted from processed source documents. The mail opening receipt date was compared with the automated system process date and processing time was calculated in term of workdays.

In 1980 the title and registration turnaround time system was changed. A sample size of 100 processed documents was selected at random each day to give a 95 percent level of confidence. Processing time was broken down for each discrete action within the whole system. In other words, processing time was calculated for mail opening, another time calculated for sorting, and so on, until the certificate of title had actually been processed.

With this more detailed information, management began to work on the numbers. Numbers that appeared disproportionately high with respect to the activity involved for a particular process in the system were worked on by special management and supervisory teams. Procedures for those processes were either scrapped or revised to permit streamlined processing. A new title and sales tax applications processing system was developed and implemented. One of the important design elements of the new system was an automated MIS for turnaround time. The necessary data storage was created on the vehicle registration file and the requisite transactions were modified to either capture or automatically acquire process date data for each defined processing point.

However, the automated system did not work and has not worked yet. The difficulty was not in capturing the data, but in the logic to determine which transactions and parts of certain transactions were pertinent to determining appropriate turnaround times.

The automated reporting system was quietly turned off. However, because the data were captured by the system, a routine inquiry transaction was used to acquire the data needed by video display terminal (VDT). Processed batches were selected at random as before. However, the sample size was increased to 2,500 because through VDT inquiry, acquisition, and manipulation of data were fairly simple, although still manual.

The turnaround time management information that began with the vehicle title and registration process has been expanded to other areas. It has been the most useful of PennDOT's MISs. The Department measures processing times for processing citations, court records, accident reports, and for processing the client in-take evaluation results for first-offense driving under the influence (DUI) drivers in the court reporting network.

As with other endeavors, time is of the essence when managing the operating systems that comprise an integrated traffic records system. Timeliness of data acquisition and reduction is an important determinant of the quality of highway safety management systems that support highway safety programming.

PRODUCTION PLANNING

The Department faced an annual crisis every spring and summer with the seasonal rise of car sales and the staff taking vacations. Adding to that crisis was the processing of driver license and learner permit applications that uses some of the same resources, such as mail opening and sorting. This activity also has an annual increase in activity at the same time. In the past the solution to this particular recurring crisis was increased staffing. However, with emphasis on staff reduction, the Department knew that it had to plan better both in terms of streamlining the processing system and staffing.

Larry White at the PennDOT Bureau of Motor Vehicles and Licensing and his staff began initial planning in the fall of 1981 by using the previous year's volumes as a model for the anticipated work flow through the various working areas. The initial application was used successfully to schedule annual leave in affected work areas.

In 1982, after acquiring an Apple III microcomputer, work began on a computerized production forecasting system for the work areas of the title and registration and driver license application systems.

Robert Baron of the Bureau of Motor Vehicles and Licensing developed the forecasting model using Visicalc. The model was designed in part to help clear external variables such as environmental changes that are contingent on political and economic conditions. A large data base was developed from historical and current data from the affected areas.

The most unpredictable factor is the external variable, volume. Volume is forecasted by taking a weighted moving average of demand. Each month the average of the last 12 months is recomputed by adding the latest month's figures and recalculating the average. The next refinement is to give greater weight to the latest information and to calculate a weighted moving average. By using a smoothing constant, the weight given to a period is reduced by a fixed proportion each time the average is recomputed.

The value of the smoothing constant usually lies in a range between 0.01 and 0.09. A low value makes the forecast slow to respond to changes in demand, and a high value makes it react quickly. In other words, if more value is necessary from the most recent data, a smoothing constant of 0.02 or greater is needed. The value used is estimated and is based on forecast error and the known accuracy of the historical data.

This statistical model requires 2 or more years of data for accuracy, with the optimum being 5 years. The average of the last 12 months is recomputed monthly by adding the latest data and then recalculating the average:

New forecast = (Forecast for current period) + [(Current period demand) - (Forecast for current period)] x (Smoothing constant).

Seasonal trends that affect processing are identified to reveal any major differences between peak monthly demand and average demand throughout the year. The forecast is adjusted for seasonal trends by the ratio of each month's demand to the annual average (Figure 1):

[(Average month) ÷ (Adjusted forecast)] x Forecast = Seasonally adjusted forecast.

Internal variables incorporated into the production control reports include sick leave, annual leave, productivity rate per man-hour, employee hours available, and employees available. Sick leave is computed by using a moving average, with the new average computed monthly. Because annual leave percentages fluctuate, the production report contains leave figures at 0, 4, 9, and 14 percent, and forecasts staffing needs at each one of these rates. Productivity rates were taken from production reports of the various units. These rates are constantly checked and updated because of the phenomenon of the learning curve, new procedures, calculating techniques, new employees, and various other factors (Figure 2).

As a result of the production forecast, line managers and supervisors have a fairly accurate idea of the volume of work that can be expected in the near future. This has enabled PennDOT's management and supervisory team to take staff from areas of low demand for use in areas of high demand. It has also been useful for scheduling overtime far enough in advance to give employees time to make arrangements, thereby increasing the number of employees turning out for overtime. And the production forecast is still used for its original purpose: determining when annual and personal leave days may be taken by employees.

Of course the true test of the effectiveness of a system is its use by management and the results obtained from that use. By that measure, this MIS has been an unqualified success. The forecasting accuracy has been in excess of 90 percent, given that only 2.5 years of historical data are available and that in 1983, for the first time in 3 years, there was a significant increase in the volume of work because of increased automobile sales.

The real proof, however, is that for the first time title and registration turnaround time has been less than 8 days during the spring and summer months. In June 1982 this turnaround time was 15.4 days; in June 1983 the turnaround time was 7.6 days,

PRODUCTION FORECASTING REPORT
DRIVER'S LICENSE SECTION (EXAMINING)

MONTHLY FORECAST
FOR NEXT 12 MONTHS

MONTH	1980	1981	1982	1983	1984	Total	Average		1983	1984
Jan		60803	66862	59376	71659	258700	64675	JAN		64227
Feb		67333	82981	67179	79652	297145	74286	FEB		73772
Mar		90375	104445	86989	79422	361231	90308	MAR		89683
Apr		95673	94888	74212	74796	339569	84892	APR		84305
May		86454	98318	80353		265125	88375	MAY		87763
Jun		96868	102958	92184		292010	97337	JUN	96663	
Jul	84765	96852	91142	82886		355645	88911	JUL	88296	
Aug	99107	81034	104877	99107		384125	96031	AUG	95367	
Sep	75012	89757	86817	82954		334540	83635	SEP	83056	
Oct	89289	60361	82983	85795		318428	79607	OCT	79056	
Nov	64001	74723	73604	82384		294712	73678	NOV	73168	
Dec	64444	76100	59376	68030		267950	66988	DEC	66524	
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Total	476618	976333	1049251	961449	305529	3769180				
Average	79436	81361	87438	80121	76382	314098				

AVERAGE	YEAR*	983264
CURRENT	DEMAND*	979222
CURRENT	FORECAST*	973697
NEW	FORECAST	976460

1. This section contains volumes received information submitted by the units, totals yearly volumes to the current month (total) and also gives average monthly volume for each year (average).

2. The report also contains the total for all homogeneous months, i.e., January, 1982; January, 1983. It also takes the average of the homogeneous months so that the forecast can be seasonally adjusted.

3. Predicted volumes for the next 12 months are given.

4. The average yearly volume, current demand (the last 12 months), and the current and new forecasts are represented. The new forecast represents the volume predicted for the next 12 months.

FIGURE 1 Production forecasting report, driver's license section.

JUNE PRODUCTION FORECAST	
PREDICTED-VOLUME	96663
PRODUCTIVITY RATE-PER MAN HOUR*	44
HOURS NEEDED	2197
DAYS IN MONTH?	21
AVG. NO. OF EMPLOYEES AVAILABLE?	16
EMPLOYEE HOURS AVAILABLE	2352
CURRENT SICK LEAVE USAGE?	.05

DISCRETIONARY HOURS

HOURS AVAILBLE AT	ADDITIONAL HOURS NEEDED (NEEDED HOURS-AVAILABLE HOURS)
.05%SICK LEAVE.04% ANNUAL----- 2140	57
.05%SICK LEAVE.09% ANNUAL----- 2023	174
.05%SICK LEAVE.14% ANNUAL----- 1905	292
.00%SICK LEAVE.00% ANNUAL----- 2352	-155
.05%SICK LEAVE.00% ANNUAL----- 2234	-38

(-)MINUS INDICATES SURPLUS HOURS

This report provides the managers with a quick analysis of what is taking place within their units.

1. Predicted volume - forecasted volume for month indicated.
2. Productivity rate per man hour - volume of work completed in one hour by an individual.
3. Hours needed - this indicates the amount of time necessary to process the predicted volume.
4. Days in month -'number of working days in month indicated.
5. Average number of employees - number of producing employees within a unit available.
6. Employee hours available - number of employee hours available (based on 7 hours).
7. Current sick leave usage - forecasted sick leave for division.
8. Hours available at current sick leave - sick leave usage minus number of hours available.
9. Discretionary hours -
   - Hours available at - includes hours available at current sick leave and annual leave usage.
   - Additional hours needed - these figures indicate additional hours needed or surplus hours available.
10. Unit capability - this figure indicates what a unit can potentially produce for the month indicated at current productivity rates and staff complement.

FIGURE 2 Productivity rates.

and that was done with less staff in 1983 than in 1982. The numbers are just as dramatic for driver licensing applications.

STATISTICAL QUALITY CONTROL

One of the most important areas of concern for the Department is product quality. In the past traditional quality control methods have been used in an attempt to produce better quality products. There was a proofreading staff that read all titles before they left the Department. There was, and is, a dedicated staff to review accident records processing. The proofreading staff represented 100 percent inspection, and like all 100 percent inspection schemes, it did not work well, and by 1979 had been dropped entirely.

But because there was no longer a quality control activity for title processing, this did not mean that the concern disappeared. In 1980, using the accident record review as a model, PennDOT began quality review by sampling techniques in critical areas of the title processing process. In 1982 a quality control staff was assembled and the error potential of the driver and vehicle operating systems was assessed.

The title and registration system was by far the most error prone. It was not startling news. The automated title and registration system is not particularly quality conscious or quality supportive. In September 1982 a capability study by Constance Whitmarsh-Tomko of the Bureau of Motor Vehicles and Licensing had been completed for all phases of the vehicle title and registration system. Control charts or p-charts were developed to show fraction rejected (Figure 3) for applications processed.

Statistical quality control techniques were chosen because of the failure of the traditional quality control model and a conviction that this was the only technique that had any hope of substantially increasing product quality. Although the Irving Trust Company of New York City has used the technique since 1975 with great success, use of statistical quality control for normal clerical operations is still rare.

To support the quality control plan and to provide management information on the outgoing quality level of the Department's products, a standardized error reporting system was developed by William Hutchinson and Ms. Whitmarsh-Tomko. Before development of this system, error reporting had been done on a unit-by-unit basis without any standardized procedure or idea of the necessary sample size. There was no qualitative measure to the particular error; any type of error rendered the entire transaction in error.

In developing the standardized error reporting system, an error reporting study was done that developed a data base of all total possible errors that could occur in the vehicle title and registration system. Errors were broken down by section and were further divided into type, impact of severity, and frequency, and a procedure for standardizing errors was then developed.

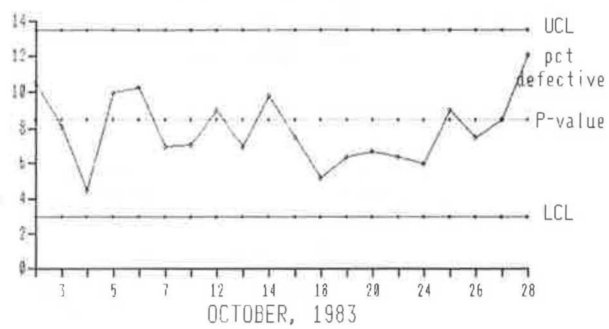

FIGURE 3 Data entry p-chart.

OPERATOR	ERROR/SAMPLE	PERCENTAGE	Q-SCORE
SUP.	0/0	0	0
122	3/140	2.14	70
102	6/140	4.29	61
103	1/135	.74	76
104	6/135	4.44	61
RET	0/30	0	74
106	3/130	2.31	70
121	4/135	2.96	67
113	0/25	0	74
RET	0/35	0	74
115	1/140	.71	76
118	0/140	0	79
119	0/20	0	73
120	5/125	4	63

TOTAL ERRORS = 29
TOTAL SAMPLE = 1330

PROCESS AVERAGE: 2.18
PROCESS CAPABILITY: 2.18

FIGURE 4 Section report giving errors and quality score by operator.

Four error-type categories were established: typing, document mishandling, judgment, and machine. All errors were assigned to one of these four types. The error types were divided by impact. Impacts were either public or system. An error affects the public if it produces a product that will not satisfy a customer's expectations. All other errors are system impact errors; that is, they delay the flow of documents and create additional work.

Finally, errors were then grouped according to their severity. Each was placed in an impact classification, which is different than the impact type in that it gives the degree of impact the error has on the system. Three classifications were used: critical, major, and minor. Critical defects will affect usability, major defects might affect usability, and minor defects will not affect usability of the output piece (1). To distinguish between errors and different impact classification, each was assigned a numerical weight, where critical = 10, major = 5, and minor = 1. Although any weight can be assigned to the classifications, these numbers give sufficient distinction among classifications and are generally considered satisfactory (1).

Once grouped by error type, impact type, and impact classification, it was necessary to develop a means for standardizing errors. All sections cannot commit the same number of possible errors; therefore, a procedure was developed to put all sections on an equal error scale. The net result was an error conversion number assigned to each error. The error conversion number will be higher per error for sections capable of committing few errors and lower per error for those capable of committing many errors. The importance of the error conversion number lies in its balancing out the probability that the section capable of committing many errors will commit more than one capable of committing few errors.

EXAMINING DIVISION
WEEK ENDED: 84/08/03

WORK COMPLETED: 47273
SAMPLE SIZE: 1180
ERRORED APPS.: 36
AVG. ERRORS PER APP.: 1.14

DEGREE OF IMPACT	ERROR DESCRIPTION	WEIGHTED FACTOR	ERROR FREQUENCY	WEIGHT ADJUSTED ERROR
VTR.TAXI	ERRORED APPS: 5 AVG. ERRORS PER APP: 1.2			
CRITICAL	1. incorrect make code	0.313	0	0.000
	2. incorrect registration expiration	0.313	1	0.313
	3. incorrect title code	0.313	0	0.000
	4. failure to reject for additional fee	0.313	1	0.313
	5. failure to reject for proof of ownership	0.313	0	0.000
	6. incorrect tag type code	0.313	0	0.000
	7. incorrect completion of tax print	0.313	0	0.000
	8. incorrect output indicator	0.313	0	0.000
	9. unauthorized missing application	0.313	0	0.000
	10. app inserted in wrong batch	0.313	0	0.000
	11. OTHER	0.313	0	0.000
	SUBTOTAL		2	
MAJOR	12. incorrect totaling of fee	0.156	0	0.000
	13. incorrect rejection code	0.156	0	0.000
	14. unnecessary rejection	0.156	0	0.000
	15. unnecessary rejection, should be special handl	0.156	0	0.000
	16. failure to code for special handling	0.156	0	0.000
	17. fail to rej /other than fee or prf of ownershp	0.156	1	0.156
	18. OTHER	0.156	0	0.000
	SUBTOTAL		1	
MINOR	19. absence of required err cde on rej/not checkin	0.031	0	0.000
	20. rejection and special handling marked	0.031	0	0.000
	21. recorded incorrect fee	0.031	0	0.000
	22. incorrect sales tax computation	0.031	0	0.000
	23. recorded fee not required	0.031	0	0.000
	24. incorrect transaction code	0.031	1	0.031
	25. failure to record required fee	0.031	0	0.000
	26. failure to stamp ID number	0.031	2	0.063
	27. incorrect special handling error code	0.031	0	0.000
	28. failure to code exemption reason number	0.031	0	0.000
	29. failure to code uncommon make	0.031	0	0.000
	30. recorded fee in incorrect place	0.031	0	0.000
	31. wrong proc fee reason cde/fail to cde reason	0.031	0	0.000
	32. OTHER	0.031	0	0.000
	SUBTOTAL		3	
	SECTION TOTAL		6	

FIGURE 5 Section report by error type, frequency, and impact.

The error conversion number is used along with the impact classification weight and a specific error frequency (error frequency data being gathered through quality assurance sampling) to calculate a weight adjusted error. The computation (Error frequency x Error conversion x Impact classification weight) is simple multiplication and gives an adjusted error rate that can be compared across division and section lines. The higher the magnitude of the weight adjusted error, the more serious are the implications of commiting that error.

This information is presented in a hierarchy of four formatted reports based on organizational level, section, division, summary, and management summary error reports. Each successful report represents the data in a manner useful to different levels and applications of management (see Figures 4-7).

This system began in September 1983 after intensive training of managers, supervisors, and lead workers by the quality control staff. The system has been on-line for only a short time, and the results are not readily available. Information from this system can now be used by managers and supervisors to gauge the quality performance of the title and registration system and for development of targeted remedial training of staff and agents. In addition, the data are being used to program system enhancements for quality improvements.

PennDOT believes that this system holds a lot of promise. Its success with the most error-prone system will mean extension of statistical quality control to other traffic records systems. In driver licensing, PennDOT is just beginning to study the possible use of statistical quality control method-

	84/06/29		84/07/06		84/07/13		84/07/20		84/07/27		84/08/03		TOTALS	
	ERRORED APP.	(%)	ERRORED APP.	(%)	ERRORED APP.	(%)	ERRORED APP.	(%)	ERRORED APP.	(%)	ERRORED APP.	(%)	ERRORED APP.	(%)
EXAMINING	40	2.95%	22	2.65%	39	3.17%	23	1.99%	39	2.93%	36	3.05%	199	2.81%
VTR.TAX1	7	2.59%	3	1.67%	4	1.78%	1	0.51%	7	2.86%	5	2.33%	27	2.03%
VTR.TAX2	14	5.83%	6	3.75%	9	3.75%	11	4.78%	7	3.33%	9	4.00%	56	4.29%
VTR.TAX3	10	3.85%	7	5.00%	9	3.91%	4	1.54%	17	4.26%	12	4.53%	59	3.80%
VTR.TAX4	3	1.18%	3	2.00%	8	3.81%	2	1.03%	3	1.54%	3	1.67%	22	1.86%
VTR.TAX5	6	1.82%	3	1.50%	9	2.77%	5	1.82%	5	1.79%	7	2.37%	35	2.05%
DATA ENTRY	75	5.57%	70	6.97%	71	4.88%	99	6.83%	83	5.57%	83	5.55%	481	5.84%
VTR.TAX1	16	6.81%	16	8.42%	10	3.92%	14	5.60%	15	5.56%	14	5.28%	85	5.80%
VTR.TAX2	8	3.17%	8	5.52%	10	3.92%	17	7.23%	7	2.86%	10	3.85%	60	4.31%
VTR.TAX3	4	1.78%	15	8.11%	14	6.09%	13	6.34%	9	3.91%	8	3.64%	63	4.86%
VTR.TAX4	21	6.67%	15	6.98%	6	2.11%	16	5.52%	15	5.56%	14	4.83%	87	5.23%
VTR.TAX5	20	8.70%	6	4.00%	15	6.00%	12	5.00%	14	5.49%	10	4.88%	77	5.79%
VTR.TAX6	6	6.67%	10	8.33%	16	8.89%	27	11.74%	23	10.45%	27	10.59%	109	9.95%
TOTAL ERRORED APPS		115		92		110		122		122		119		680
SAMPLE QUALITY RATE		95.74%		94.99%		95.90%		95.32%		95.67%		95.55%		95.56%
PREDICTED QUALITY RATE		94.98% - 96.5%		93.99% - 95.99%		95.15% - 96.65%		94.51% - 96.13%		94.92% - 96.42%		94.77% - 96.33%		95.23% - 95.89%
PREDICTED ERRORED APPS		3130 - 4490		2308 - 3460		3083 - 4463		3103 - 4402		3168 - 4496		3148 - 4485		20282 - 23539
APPLICATIONS PROCESSED		89439		57566		92030		80178		88505		85764		493482

FIGURE 6 Weekly summary report for full quality control reporting.

	CRITICAL		MAJOR		MINOR		TOTALS		
	ERROR FREQUENCY	WT.ADJ. ERROR	ERROR FREQUENCY	WT.ADJ. ERROR	ERROR FREQUENCY	WT.ADJ. ERROR	ERROR FREQUENCY	WT.ADJ. ERROR	ERRORED APPS.
EXAMINING	72	22.500	84	13.125	58	1.813	214	37.438	199
VTR.TAX1	16	5.000	4	0.625	9	0.281	29	5.906	27
VTR.TAX2	24	7.500	21	3.281	14	0.438	59	11.219	56
VTR.TAX3	18	5.625	26	4.063	18	0.563	62	10.250	59
VTR.TAX4	9	2.813	6	0.938	8	0.250	23	4.000	22
VTR.TAX5	5	1.563	27	4.219	9	0.281	41	6.063	35
DATA ENTRY	256	117.315	177	45.903	70	4.405	503	130.185	481
VTR.TAX1	45	16.667	31	5.741	11	0.407	87	22.815	85
VTR.TAX2	35	12.963	21	3.889	8	0.296	64	17.148	60
VTR.TAX3	33	12.222	13	2.407	17	0.630	63	15.259	63
VTR.TAX4	40	14.815	27	5.000	24	0.889	91	20.704	87
VTR.TAX5	49	18.148	29	5.370	1	0.037	79	23.556	77
VTR.TAX6	54	20.000	56	10.370	9	0.333	119	30.704	109

TOTAL WORK PROCESSED: 493482

TOTAL SAMPLE SIZE: 15321

TOTAL ERRORED APPLICATIONS: 680

ERROR RATE: 4.44%

FIGURE 7 Summary report.

ologies to improve the quality of Pennsylvania drivers.

These MISs are just a sample of the smaller MIS used to operate the driver and vehicle record systems. Although these are specifically pertinent to Pennsylvania, the concept is applicable to any jurisdiction.

These systems have enabled Department management to focus on pertinent and highly relevant problem areas. They have helped measure and guide solutions. The greatest gift, however, has been time. With the operating systems working fairly efficiently, less time is spent by traffic records managers solving crises. Oftentimes these small MISs highlight problems well in advance of the crises stage while their solution is still fairly simple and quick. In addition, the data from these systems often point to the solution.

With management time available, instead of consumed by endless rounds of "firefighting," managers can structure, plan, and nurture that other part of traffic records--the safety MISs.

REFERENCE

1. D.H. Besterfield. Quality Control: A Practical Approach. Prentice-Hall, Englewood Cliffs, N.J., 1979.

Pennsylvania Driving Under the Influence Extra Enforcement Grants: How Traffic Records Can Assist a Highway Safety Program

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ABSTRACT

From 1982 through 1983 the Pennsylvania Department of Transportation has funded 25 driving under the influence (DUI) extra enforcement grants. These grants consisted of patrol units of one or two officers dedicated solely to enforcing DUI laws. The hours of operation of the units, generally 10:00 p.m. to 4:00 a.m. on weekends, were suggested by data contained in Pennsylvania's accident records system. The 25 counties that received grants were identified from data contained in Pennsylvania's accident records system. A highway safety planning tool called the municipal accident priority system was used to generate a list of Pennsylvania's 67 counties in descending order of their alcohol-related accident problem. Originally, proposals were solicited from the top 20 problem counties. Thirteen counties responded and received grants. In the second phase proposals were solicited from the second group of 20 problem counties. Twelve of these counties received grants. The extra enforcement grants have resulted in increases in total DUI enforcement levels, ranging as high as 410.53 percent. The cost per arrest under the grants ranged from $220.28 to $613.51 during the hours specified. Preliminary accident statistics suggest that accident activity has decreased more in the municipalities with DUI extra enforcement grants than in those municipalities that did not have grants. This is encouraging, but further research will be necessary to more exactly determine the contribution of increased DUI extra enforcement to decreased accident activity.

There is general agreement in the highway safety community that an increased level of enforcement is the single most effective countermeasure to reduce the number of alcohol- and other drug-related accidents. The theory is that increased enforcement deters people from driving drunk by making them believe that they will be caught if they do.

The nationwide average level of driving under the influence (DUI) enforcement was approximately 1.8 arrests per officer in 1982 according to NHTSA. Some highway safety experts have suggested that an average of at least 2.0 arrests per officer would be necessary to have any meaningful impact. However, there is little, if any, empirical evidence to support this proposition.

Enforcement rates vary greatly from state to state and even within states. Pennsylvania has traditionally been at the low end of the spectrum. Figure 1 shows the DUI enforcement in Pennsylvania from 1978 through 1982. The level remained fairly consistent through 1980 at or below 0.8 arrests per full-time officer.

However, Pennsylvania's level of DUI enforcement increased 37 percent (from 0.84 to 1.15 arrests per officer) from 1980 through 1982. There are two main reasons for this increase. First, police officers and management were responsive to heightened public interest in the DUI problem. In response to this heightened interest, Governor Dick Thornburgh ap-