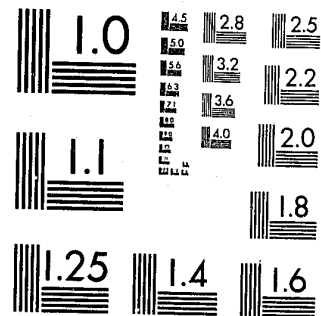


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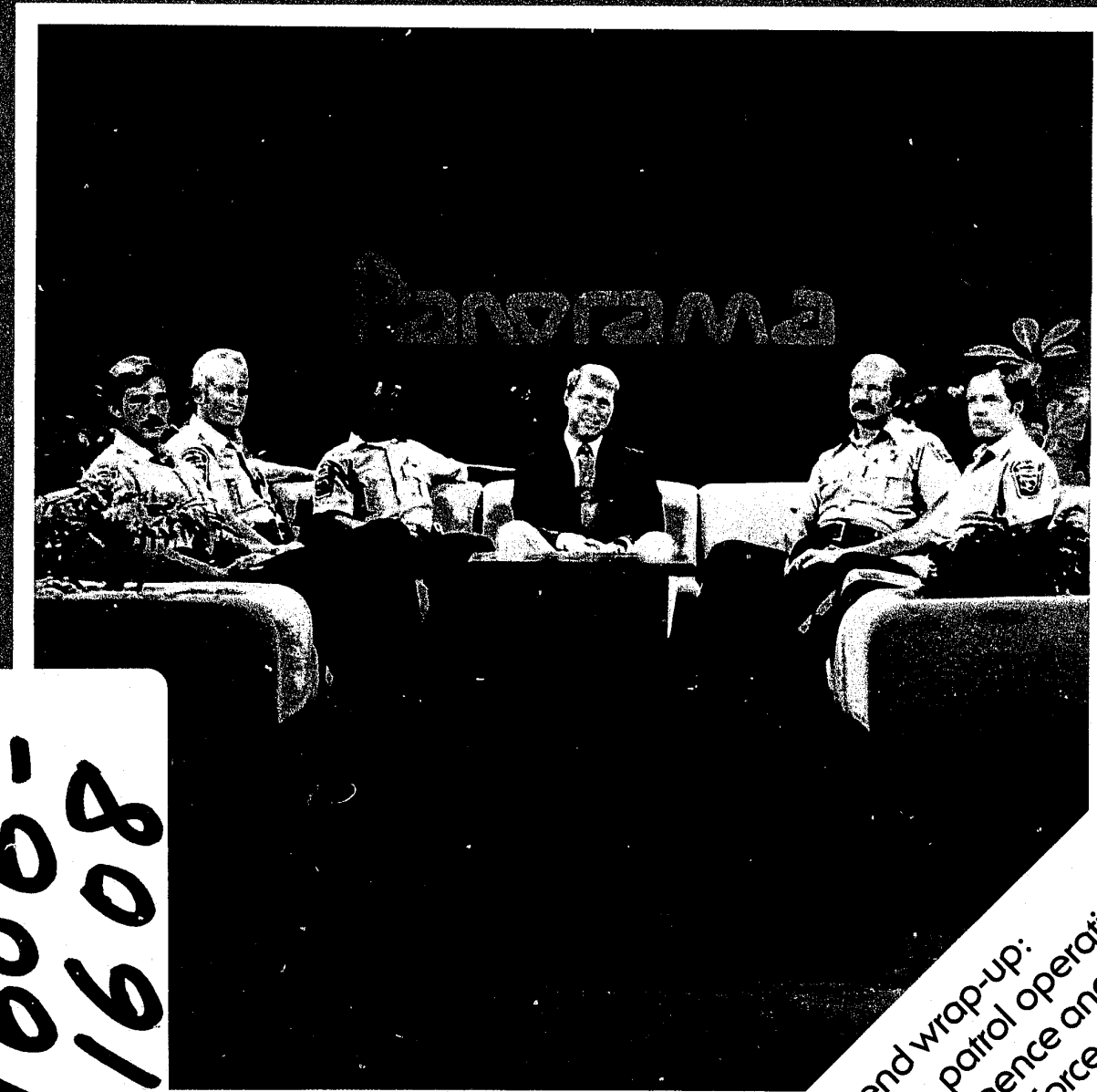
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Police Chief



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81608

Year-end wrap-up:
terrorism, fitness, patrol operations,
juveniles, intelligence analysis,
and deadly force.



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1982 (89th)—Nov. 13-18 Atlanta, Ga.
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1984 (91st)—Oct. 20-25 Salt Lake City, Utah
1985 (92nd)—Oct. 19-24 San Francisco, Calif.
1986 (93rd)—Oct. 4-9 Nashville, Tenn.

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Managing Patrol Operations

Before, during, and after in Charlotte, North Carolina.

By JAMES B. HOWLETT / S.H. KILLMAN / JAMES B. HINSON

Managing Patrol Operations (MPO) was an experiment to determine the extent to which the police patrol function can be effectively managed. The experiment recognized the relationship which exists between patrol and support functions. The MPO project was sponsored by the National Institute of Law Enforcement and Criminal Justice (now the National Institute of Justice), U.S. Department of Justice. The experiment was conducted in three cities: Albuquerque, New Mexico; Charlotte, North Carolina; and Sacramento, California.

The police department in each of these cities was awarded a grant to fund the experiment; in Charlotte, the grant award was \$175,000. A separate LEAA block

grant provided an additional \$136,720 to fund a crime analysis section for a two-year period. Each department was given the discretion to approach the implementation of MPO in the manner which it felt most appropriate to that agency; each department did indeed proceed differently. The narrative which follows describes the Charlotte experience during the life of the MPO project there: September 13, 1978 through July 31, 1980. The impact of the project, as you will see, is still being felt and debated in Charlotte.

Department Before MPO

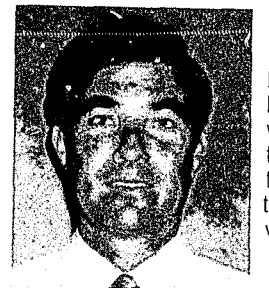
Since 1974, the Charlotte Police Department has been totally committed to the concept of team policing. That commit-

ment was not altered by the MPO project and, in fact, was one of the factors considered in awarding the department the MPO grant: What, if any differences would result from implementing MPO under team policing as opposed to the more traditional organizational structure of other departments?

Prior to MPO, the city was divided into three patrol bureaus, each of which was further divided into five highly autonomous teams. Each of the fifteen teams was responsible for handling most functions within its team boundaries (e.g., investigations, crime prevention, school resource activities, crime scene search, and so forth). The only field operation functions not delegated to the teams were the airborne (helicopter) section and the central investigations bureau (responsible only for extended and intensive follow-up investigations such as some, but not all homicides and vice/narcotics investigations).

Each team was commanded by a captain and was staffed by four sergeants and twenty-eight police officers. The teams were configured so that workload (computed on the basis of calls for service and five weighted suppressible offenses*) was equally distributed among them. Although each team captain was given a high degree of autonomy in the management of his team, departmental policy dictated that manpower deployment be made in proportion to calls for service for each shift and day of the week. No uniform procedure

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Major S. H. KILLMAN is a twenty-year veteran of the Charlotte Police Department. He has served in virtually every function within the department during that time. Major Killman is currently the commander of the administrative services bureau. Prior to this assignment, he served as director, Managing Patrol Operations Project and bureau commander, patrol bureau, within which major elements of the MPO project were tested.

JAMES B. HINSON served as management analyst for the Charlotte Managing Patrol Operations Project. He is currently the system coordinator for the Charlotte-Mecklenburg Criminal Justice Information System. Hinson has worked with operations research, and program planning and evaluation in law enforcement, criminal justice, and correctional environments and is particularly interested in the interactions and relationships among criminal justice agencies. He is a graduate of Yale University.



Authors' note: Since this article was originally authored, the Charlotte Police Department has undergone a substantial reorganization based, in large part, upon the results of the Managing Patrol Operations (MPO) Project. On December 31, 1980 Chief M. M. Vines assumed command of the department, and on April 1, 1981, Chief Vines implemented the following changes:

1. The number of divisions within the department was increased from three to four with the addition of an investigative division; the investigative function was expanded and centralized. Major felony cases are now assigned to the investigative division which includes crimes against persons, crimes against property, vice narcotics, special information (intelligence), and a youth bureau. Team investigators were centralized into bureau investigation sections.
2. The number of patrol bureaus was reduced from three to two. Each of these bureaus is composed of four patrol teams reducing the number of teams from twelve to eight.
3. All patrol officers are now deployed using PCAM and Hypercube.
4. Crime analysis was reassigned from the services division to the field operations (patrol) division. The concept of directed patrol was retained.
5. Call prioritization and the expeditor unit were retained and fully institutionalized.

*The suppressible offenses were robbery, burglary, larceny from auto, personal injury accidents, and auto thefts. Weights of eight, six, five, two and 1 calls for service were assigned to each of these offenses, respectively.

existed to govern this process, however; and actual deployment procedures varied widely among the teams.

Since 1974, the Charlotte Police Department's communications bureau has used a computer assisted dispatch (CAD) system. Complaint clerks enter incoming call data into a computer terminal, and the computer routes the information to the appropriate dispatcher for each bureau. Prior to MPO, calls were queued at each dispatcher's console, first, by the priority assigned to the call by the complaint clerk and, second, by the time it was entered in the computer for dispatch.

Two call priorities existed prior to MPO: emergency and routine. Although written guidelines for call prioritization did not then exist, incidents which clearly demanded immediate police presence were classified as "emergency"; all others received a "routine" classification. All calls were dispatched in order of their arrival as soon as a unit became available: emergency calls were dispatched first and never intentionally delayed. If all units in a given team were busy, the dispatcher, with the assistance of CAD, would locate and dispatch the nearest available unit in another team. Even routine calls were dispatched in this manner after they had been in queue for thirty minutes. The resulting

cross team dispatching, of course, tended to compromise team integrity and accountability.

Before the advent of MPO, records clerks (civilians) were authorized to take offense reports in misdemeanor cases where the property loss did not exceed \$200.00. These complaints were taken both over the telephone and from walk-ins in person at the Law Enforcement Center. If the offense exceeded the \$200.00 limit, policy required the clerk to have communications dispatch a field unit to meet the complainant wherever he/she might be including the Law Enforcement Center; a police officer would then take the report.

The crime analysis function within the department, prior to MPO, was performed in a rather informal manner. It was divided between the airborne and planning section. Both sections kept statistical records and conducted some broad trend analyses. Their products were primarily administrative in nature and were of only slight value to field operations personnel for day-to-day tactical planning. Some of the teams conducted their own operational oriented analyses which, however, varied widely as to method, quality, and frequency; interteam dissemination of analysis products was minimal at best.

There was no regularly scheduled, problem-specific directed patrol activity

prior to MPO. Teams responded to citizen complaints and requests from City Hall, but no uniform procedures existed for problem identification, tactical planning, or patrol performance evaluation. Crime prevention activities tended to be oriented toward general concerns rather than specific problems; and, again, these efforts varied widely from team to team.

Just prior to the city's learning of the MPO project, a productivity study of the Charlotte city government was completed. With regard to the police department, the study recommended, among other things, that the department reduce its patrol force by 91 officers. Needless to say, this recommendation did not go unnoticed by the rank and file of the department. In arriving at the conclusion that the patrol force was over staffed, the authors of the productivity study had considered only calls for service as an indicator of the workload. Ignored were the other components which make up the full range of officer activities: court and other administrative duties, self-initiated calls, and the like. Although convinced of the inadequacy of the productivity study, the department's administrators lacked sufficient documentation to convincingly counter the arguments set forth in the study.

In Charlotte, the MPO project consisted of two highly interactive processes: (1) re-

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source allocation and (2) formal directed activity. The resource allocation process consisted of four components all intended to increase departmental efficiency and free valuable patrol time and manpower for directed activity. Those four components were: computer designed work schedules, computer assisted resource allocation (PCAM and Hypercube), call prioritization, and an expeditor unit. The process of formalizing directed activity, intended to increase the effectiveness of the patrol force, consists of crime analysis and directed patrol.

When the MPO project was proposed, it presented a number of timely opportunities. By using the computerized resource allocation modules, the department had the opportunity to understand the numerous factors which influence field performance better. By using the project's call management techniques, the department saw an opportunity to manage calls for service more effectively and improve its response to citizen needs. Crime analysis and directed patrol presented an opportunity to increase the department's impact upon identified problems while, at the same time, documenting the actual time expenditures of patrol time over and above response to calls for service. The evaluation component of directed patrol would also increase the accountability of the patrol force and serve as an aid to future planning and decision making.

The formal beginning of MPO was marked by a series of training seminars conducted for various staff members who would be most closely involved with the project. Training for all three MPO sites was combined. This helped to engender a spirit of camaraderie and competition among the three cities as well as to provide for equality of training. The national MPO training team also made a number of site visits to each city to assess both their needs and capabilities in each of the MPO component areas.

At about the same time as the training of departmental personnel by the national coordinators, the planning process for MPO began in Charlotte. First, an MPO planning committee, composed of 63 persons representing all ranks and assignments in the department, met to anticipate and plan around problems which might be created by MPO. The planning committee was divided into five subcommittees, each to study one aspect of the MPO project and make appropriate recommendations regarding the following areas: workload analysis; prioritization and management of calls for service; directed patrol; crime analysis, and reporting forms. It should be noted that written reports were required throughout the entire duration of the project in order to insure documentation.

The department's planning section worked with the project director and, using the reports of the subcommittees, developed a preliminary plan for the implementation of MPO in Charlotte. That plan was subsequently approved by the chief of police. The planning committee was then convened for one last meeting during which the main provisions of the preliminary implementation plan were explained and questions were answered. This feedback process, maintained throughout the project, significantly increased the support and cooperation of key personnel during the project. Similar reporting and feedback was provided to the city manager and city council.

Next, an MPO steering committee, consisting of sixteen persons of all ranks and from all sections of the department, was formed to provide valuable input into the development of Charlotte's MPO program plan. Within a month of the first meeting of the steering committee, the plan was developed, staffed, revised, submitted, and approved by the chief. With the approval of the plan, the first six months of the eight-month preimplementation period expired. The remaining two months of the preimplementation period were dedicated to data collection for use with the computer models (PCAM and Hypercube) and completion of detailed plans for each of the project's components. During this period, every sworn member of the department and many civilian employees underwent an eight-hour block of training regarding the background, philosophy, and purpose of the MPO project as well as how it was to be implemented. The training block also introduced the first of many of the changes to be brought about by MPO—new report forms. It was felt at the time that it was best to explain the project in detail to each and every person to be affected by it and to provide an opportunity for those persons to ask questions in order to reduce apprehension about forthcoming changes and lessen rumors. This strategy proved to be moderately successful.

MPO Implementation

As stated earlier, there were six major components of MPO to be implemented during the life of the project: (1) computer developed work schedules, (2) computer assisted resource allocation, (3) call prioritization, (4) expeditor unit, (5) crime analysis, and (6) directed patrol.

Charlotte approached the project as objectively as possible. Each of the components would be implemented and evaluated on its merits. If, at the end of the project, a component was judged a success it would be retained; if it failed, it would be rejected. The high degree of relationship

among components was recognized to prevent each component from being judged as a discreet entity but rather as a dependent variable. Finally, it was recognized that at least two factors would confound the project's evaluation: the implementation of a 911 telephone system and the annexation into the corporate limits of Charlotte of several square miles of land area containing several thousand people. Both of these changes would come about shortly after the initial components of MPO became operations.

Computer designed work schedules. Using the microcomputer to design work schedules was the first and easiest of the MPO components to implement. During the first two weeks of May 1979, each team captain was trained in the use of the micro computer. They used historical calls for service data as workload indicators for each shift and day of the week. By simply entering the available manpower on a given shift and the calls for service data for each day of the week on that shift, the computer would calculate a work schedule which would best match manpower to changing daily workload on each shift. The use of the computer for this purpose was generally well received, although the computer was occasionally used as a scapegoat when the workload mandated that few weekends off would result.

Time and experience, as well as discretion, eventually overcame most of this problem. There was little doubt that the computer made more efficient use of resources. A work schedule better fitted to the workload requirements of each shift could now be developed in fifteen to twenty minutes where before a less accurate schedule might take as much as eight hours to design.

Finally, in November 1979, a new departmental policy mandated the redesign of work schedules using the micro computer every three months. Schedules are required to be based upon the preceding twelve months' calls for service data for each shift and day of week. This policy has, then, served to create more uniformity among teams since any deviation from the computer designed work schedules (and a reasonable amount of discretion is certainly allowed and encouraged) requires the approval of the bureau commander.

Computer assisted resource allocation. Without a doubt, the most complex and controversial component of the MPO project was the use of the two computer models, PCAM (Patrol Car Allocation Model) and Hypercube. It was also the single most expensive and time-consuming aspect of the project.

The first decision to be made was whether to set one or both of the models up

on the city's computer or to use a national time share system. All three of the MPO sites opted for the time share system for two reasons. First, it allowed the three cities to share in some of the basic data processing costs; and second, it would allow the MPO training contractor, located in St. Louis, Missouri, to be able to access our data files and provide technical assistance without incurring the additional time and expense of travel to Charlotte. With those administrative decisions made, the necessary hardware (telephone terminal) was leased, staff members trained, and the data bases developed.

Next, command personnel and the MPO staff met to discuss a strategy for developing several alternative team configurations which would later be evaluated on their relative merits with respect to the performance measures calculated by PCAM. A preliminary examination of the configuration as it then existed indicated that the three patrol bureaus were not equal in workload and that the forthcoming annexation of land area and population would magnify the imbalance.

Given the requirement for equal staffing among bureaus, it was necessary to redraw bureau boundaries in order to equalize the workload among them. This was accomplished by determining the sum of the calls for service plus Part One offenses for 1978 in each of the city's 461 reporting areas and then distributing adjacent reporting areas among the three bureaus so as to equalize their workloads. After the new bureaus were designed, they were then divided into three alternative team configurations. Each team within a given configuration would be staffed with an equal number of personnel.

The three configurations chosen were five teams per bureau, three teams per bureau, and two teams per bureau. Each of the resultant configurations was then analyzed with PCAM; and after reviewing the results of the analyses, the chief of police selected one to implement and test in the field.

As the development of the team configurations was nearing completion in early August 1979, command personnel again met to establish performance criteria to be imposed by PCAM in its prescriptive mode. (Briefly, PCAM can be run in either a prescriptive mode where performance criteria are set—travel time, average utilization of patrol units, and average delay time—or a descriptive mode which calculates these performance criteria given a particular level of manpower in a team. For the prescriptive mode, performance criteria were set at 9 minutes average travel time, 50 percent average utilization of a patrol unit, and 30 minutes average delay time. The average number of cars available were included among these con-

A great deal of effort and planning went into anticipating and minimizing citizen complaints or confusion over these new call priorities. . . As a result . . . the program met with amazingly little citizen resistance; and, in fact, a great deal of praise and acceptance.

straints but varied with the team configuration: one per team for five teams per bureau; two per team for three teams per bureau; and three per team for two teams per bureau.

Each team in each of these three configurations was analyzed by PCAM. An evaluation of the PCAM output suggested that two teams per bureau was most efficient; more teams required more personnel to meet the performance criteria. Also, although the bureaus had been balanced for workload, PCAM predicted that Baker Bureau would require 22 percent more units to provide the same level of service as the other two bureaus. This was primarily due to different demographic characteristics and, for example, a lower population density and greater land area than the other two bureaus.

After studying the PCAM output, department managers elected not to commit the entire patrol force to a reorganization without first testing PCAM's validity as a predictive and analytical tool for Charlotte. Therefore, it was decided to implement the two team configuration based upon PCAM in Baker Bureau only; the other two bureaus would remain at five teams each although boundaries were adjusted to equalize the workload among them. PCAM has predicted that Baker Bureau, despite its greater personnel needs, would deliver the same level of performance as the other two bureaus because of its more efficient two-team configuration. The department hoped to test PCAM without compromising service levels while maintaining equal staffing among bureaus and minimizing changes in the field.

PCAM was used to calculate manning levels for three basic shifts plus a fourth, or overlay, shift for each day of the week. These figures were entered into the micro computer to develop work schedules for each of the Baker Bureau teams. The five reconfigured teams in each of the other two bureaus continued to use calls for service data as workload indicators for entry into the micro computer to develop their new work schedules.

Finally, the Hypercube model was used to design ten response areas (beats) within each of the two Baker Bureau teams. The Hypercube output not only designed the response areas but the output was used to construct tables which specified the priority and activity level of each of the ten basic response areas plus "overlay" response areas. The tables showed which response areas would be left vacant if less than ten field units were available in one of the teams on any particular shift. If more than ten units were available they would be assigned to "overlays" of two or more of the basic response areas.

All of the above changes required many administrative and support unit changes. Team commanders and sergeants in the Baker Bureau had to be trained in the use of the priority tables; new radio call signs had to be developed for the Baker Teams; and the computer assisted dispatch system had to be completely reprogrammed to accommodate all of the new team boundaries. Other minor adjustments were made; and finally, on November 27, 1979, the new team boundaries were implemented and became operational.

Call prioritization. Prior to developing and implementing the call prioritization phase of MPO, the communications bureau commander once commented, "We don't manage the calls, the calls manage us." The MPO steering committee was assigned the task of correcting that situation.

The department's policy of immediate dispatching resulted in three major problems:

1. Rapid mobile response to relatively unimportant calls resulted in no identifiable benefit to either the caller or the department.
2. Relatively low priority calls competed with high priority incidents for patrol resources. In some areas, routine calls could strip an area of units and increase response times to emergencies.
3. The current no screening, immediate dispatch policy fragmented patrol time and reduced the department's ability to commit blocks of time to directed patrol.

A decision was made to develop a system of four call priorities which would reduce response time to high priority inci-

dents, consciously and responsibly delay response to some routine calls, increase the volume of calls handled by telephone or as walk-ins, and secure blocks of time to dedicate to directed patrol. The following four call priorities were defined: (1) emergency, (2) immediate, (3) routine, and (4) referral.

Emergency calls were defined as those which take precedence over all other calls, would be dispatched immediately, and would require response by the nearest available field unit even if that unit was on a directed patrol assignment. Crimes in progress and situations involving a significant threat to life would fall into this classification.

Immediate calls were defined as those which require immediate police presence but do not carry with them the life threatening characteristics of emergency calls. Significantly, these calls would not take precedence over directed patrol; the closest available unit *not on a directed patrol assignment* would respond.

Routine calls were defined as those where police presence was desirable but where a rapid response would not affect the outcome of the situation. Policy permitted the formal delay in dispatching these calls of up to fifty minutes.

Referral calls were those which do not require police presence and can be handled to the satisfaction of both the caller and the department by alternate means. To handle these calls, an expeditor unit would be established; that unit would take reports and handle inquiries by phone as well as walk-in traffic.

It should be stressed at this point that a great deal of effort and planning went into anticipating and minimizing citizen complaints or confusion over these new call priorities. Communications personnel were extensively trained in properly classifying calls and explaining to the caller that, in the case of a routine call, there might be a delay of up to one hour; if the caller insisted on a more rapid response the call was reclassified to immediate status. In the case of referral calls, the caller was to be made to realize that the department is able to provide better and faster assistance by letting the caller "talk to a police officer." Again, if the caller insisted, a police officer would be dispatched. As a result of the use of well-trained personnel and a well-planned media campaign which preceded the implementation of the call prioritization component of MPO, the program met with amazingly little citizen resistance; and, in fact, a great deal of praise and acceptance.

Expeditor program. As mentioned above, the expeditor unit was closely related to and was, in fact, a major component of call prioritization. The expeditor

unit was charged with the responsibility of providing an alternative to dispatching a patrol unit in those cases where police presence was not required. Specifically, the expeditor unit could handle inquiries and take reports by telephone, handle walk-ins, and serve warrants on individuals who presented themselves at the Law Enforcement Center after receiving a warrant notification. The use of expeditors to serve in this role was expected to conserve patrol officer time, conserve gasoline, and reduce wear and tear on patrol vehicles.

The expeditor unit was staffed by seven police officers under the supervision of a sergeant. Organizationally, it was placed under the field operations division. The unit was to be staffed 24 hours per day, seven days a week. The unit was also provided with a CAD terminal so that a patrol unit could be dispatched if, in the judgment of the expeditor, police presence was necessary. Expeditors were expected to minimize their use of patrol units, however. If, for instance, a person surrendered himself on a warrant, the expeditor was expected to complete the necessary paperwork and walk the subject to the jail for booking. If, however, the unit's workload was so heavy as to demand the presence of all expeditor personnel or if only one expeditor was on duty, the expeditor would complete the paperwork and request a field

unit to respond to transport the prisoner. By so doing, the time required of the field unit would be reduced. Policy stated that the expeditor unit never be left unstaffed.

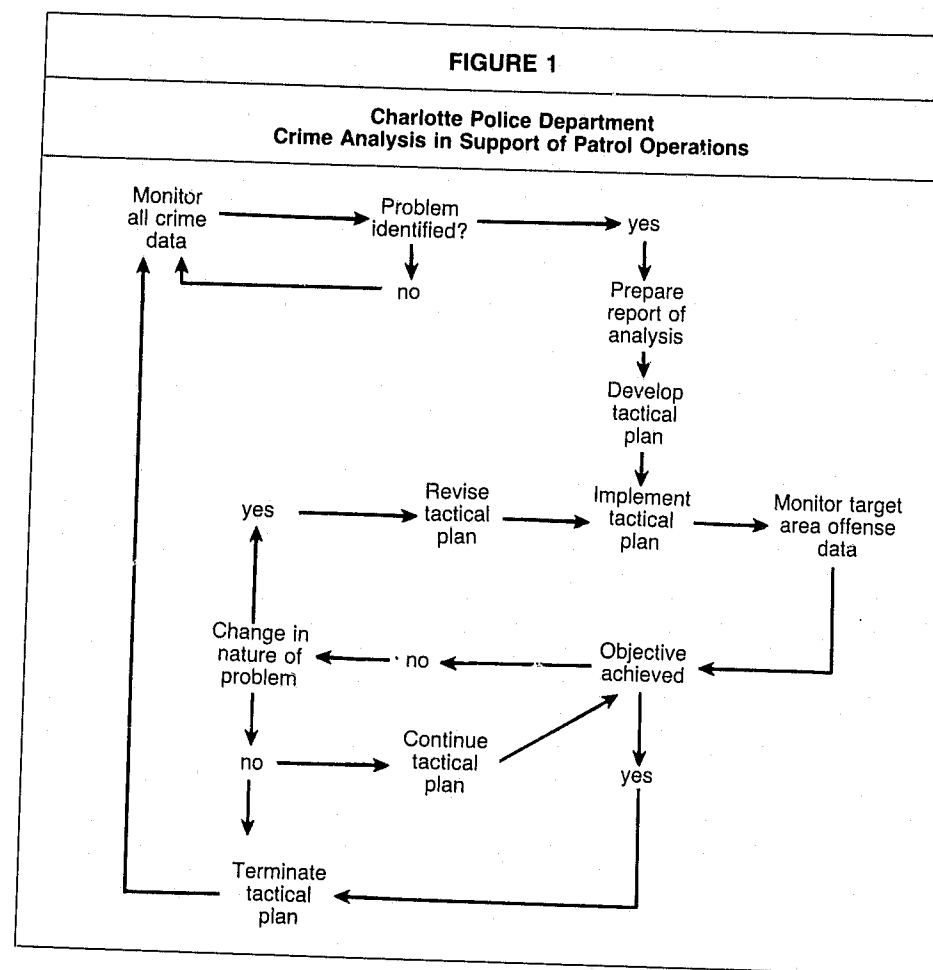
Crime analysis. Prior to the MPO project, there existed no formal, permanently staffed section within the department to provide the information required to identify problems amenable to police intervention, evaluate the impact of police intervention, measure productivity, develop tactical plans, or provide information required for long range planning. Such a capability would obviously be required to support the directed patrol component of MPO. Therefore, it was decided to establish a permanently staffed field oriented crime analysis section charged with the responsibility of identifying crime and service problems in each team area and of reporting these problems together with tactical recommendations to the appropriate command personnel. The section would also be responsible for monitoring and evaluating the impact of directed patrol tactics upon target problems.

The section was allocated five personnel positions including a supervisor, secretary, analyst, and two computer programmers. The section became operational in April 1979, and began reviewing existing capabilities with regard to data collection, storage, and retrieval in order

to determine what additional capabilities would be required to conduct effective and efficient crime analysis. It was determined that the existing automated data bases were adequate for the initial needs of the section although a new manual system would have to be developed. New computer programs were written to exploit the automated data base. A new manual information storage system was also developed to use existing report forms. By using existing data resources, the implementation of the crime analysis section was achieved with minimal impact upon the operations of other sections of the department.

In May 1979, the section began producing daily summaries or "recaps" of rapes, robberies, storebreakings, and housebreakings. These recaps were disseminated to all team investigators and to the central investigations bureau to assist them in spotting offenses with similar MO's in different teams and command areas. In December 1979, the recaps were discontinued because their use did not appear to justify the time and manpower required to prepare them. The recaps were replaced by reports of analysis for use in supporting directed patrol activities in the operations division.

A report of analysis is generated whenever any one of the three circum-



stances occur: (1) the frequency of incidence of an offense in a specific geographic area rises above its historical upper threshold, (2) a pattern of offenses linked by MO is revealed, or (3) a problem is identified by a team. A report of analysis is as detailed as possible. When known, the report should state the following: (1) type and nature of the problem, (2) location of the problem, (3) time(s) of day and day(s) of week problem is occurring, (4) victim characteristics, (5) MO, (6) suspect(s) and suspect vehicle(s), and (7) tactical recommendations.

The team, bureau or division commander to whom the report is addressed is to respond to the report but is not required to adopt the recommendations of the crime analysis section. Tactics may be accepted as recommended, modified or rejected completely and replaced by those developed by team personnel. In some cases a team may elect to do nothing at all if extenuating circumstances exist. No matter what course of action is selected, it must be justified to both the bureau and division commanders. Strategic recommendations may be appropriate when new or unusual problems are detected and the department is not equipped to cope with them. In those cases, training or the acquisition of new or additional resources may be recommended.

Once a tactical plan, which must include at least one quantitative objective, is implemented, crime analysis must monitor and continuously evaluate the target area and problem, and report any meaningful changes in its nature (such as movement, time, day, reduction and so forth). Changes must be reported to the team concerned in a timely manner. This process is intended to assure that the tactics match the problem as closely as possible and also to assure to provide the information needed to make a rational decision regarding when to terminate a tactical operation. *Figure 1* summarizes the crime analysis process as it supports directed patrol in Charlotte.

In addition to supporting field operations, the crime analysis section is responsible for managing the department's management information system, preparing all statistical reports for administrative use by department and other city management personnel, and maintaining all original offense and supplement reports prepared by department personnel. An automated offense/known offender/field interview file is also to be developed by the section.

Directed patrol. Directed patrol was the last of the MPO components to be implemented although it was built upon the efficiencies achieved by those components

which preceded it. Although, prior to MPO, it was not unusual to assign an officer to patrol known high-crime locations when not assigned to a call for service, the procedure was highly informal. Directed patrol would formalize and expand upon this practice. A study was made of approaches to directed patrol use by other departments, but none were considered appropriate to Charlotte's unique needs, created, in part, by its decentralized, team policing organization.

While crime analysis would serve as a central source of information, the actual planning and implementation of directed patrol would take place within each individual team. Crime analysis would prepare a detailed identification and description of problems, recommend a tactical approach to counter the problem, and evaluate the tactics implemented but would have no direct operational control over the tactical conduct of field units.

As stated earlier in the discussion of call prioritization, directed patrol in Charlotte was to be based upon the premise that some patrol assignments are more important and productive than some calls for service. Therefore, directed patrol assignments were to have the same status as a call for service. A dispatcher would interrupt a unit on directed patrol only to assign an emergency priority call. Some directed patrol assignments such as decoy operations or covert surveillances might make a unit absolutely unavailable for calls for service if either the dress or mobility of the officer was inappropriate for such calls. Team captains were encouraged to involve patrol personnel when developing their tactical plans. It was thought that the program would be better accepted if the officers themselves participated in the planning process.

The necessary training was completed, forms developed, and a test of the entire directed patrol process was made. The machinery was designed to capture certain information relative to directed patrol and other directed activities such as the nature of the assignment and the number of man hours devoted to each of the assignments. The department set for itself the goal of devoting an average of 25 percent of total patrol time to directed patrol. The time for this activity would result from the efficiencies created by the other components: work schedules better matched to workload, a more efficient allocation of resources among teams, call management to formally order the dispatching of calls for service, and an expeditor unit to absorb some of the workload formerly handled by field units. This, the final component of the MPO project, became operational on December 13, 1979, with the issuance of the first reports of analysis from crime analysis to the teams.

Post Implementation Period

When one considers all of the changes which occurred within the Charlotte Police Department in a period of about seven months, most of which were directly related to MPO, it becomes obvious that the sheer volume of changes can make the program appear menacing, incomprehensible, and chaotic. Yet, because of careful planning, the department continued to function. Although a formal evaluation had not yet been completed, it appeared that each of the individual components of MPO was functioning well.

Certainly, problems were encountered and some resistance was met at various levels within the department. But the magnitude of the problems and the degree of resistance were manageable. And as time passed, the components became better coordinated and the entire project continued to gain momentum. From January through June 1980, the MPO project ran as a fully operational program. At the same time, data was being collected for evaluating the impact of the project. That evaluation was completed on July 31, 1980, when the MPO project formally ended.

Project Results

Patrol car allocation model (PCAM). As mentioned earlier, the use of PCAM

and Hypercube were the most complex and controversial aspects of the MPO project. In fact, the complexity of the PCAM model as well as its output led to most of the controversy. The test design (two bureaus with five teams each and one bureau with two teams) compounded the complexity by providing results which lent themselves to several, possibly conflicting interpretations.

Briefly, the use of PCAM to evaluate alternative team structures, rather than simply to adjust deployment, was somewhat unusual. The results of our experiment suggest, however, that the model can be successfully used in this manner. Used this way, the need for precise input data becomes more critical than if the model is used to simply evaluate or design deployment strategies in a given area. Nevertheless, it seems clear that PCAM does seem to produce a better match between manpower and workload than can be achieved either manually or even with the assistance of the micro computer alone to design work schedules.

We found that PCAM assumes that only officers assigned to a team are available to answer calls in that team and, further, that there are no cross team dispatches. Similarly, it assumes that a team's workload is a function of calls within that specific team area only. These assumptions do not cor-

respond to actual circumstances in Charlotte. Consequently, PCAM tends to exaggerate the differences among teams which actually share, to a degree, both resources and workload.

A second problem which was encountered as more a problem created by faulty data input rather than by PCAM itself. We used the same response speed for each team (14 mph) rather than estimating separate response speeds for each team. This speed is too high for the congested downtown areas and far too low for the suburban areas. Additionally, we input personnel allocations which were 40 percent higher than actual since we failed to incorporate a relief factor for days off, vacation, sick leave and so forth. Given these errors, PCAM predicted the relative travel time of the twelve teams with a high degree of accuracy (within one minute for all but four teams). It is believed that concentrations of workload within highly congested areas in most teams, the overestimation of personnel, and underestimation of travel times in areas of low density tended to compensate for each other. Therefore, we conclude that, given time for more careful and accurate data collection and calibration of the model to actual field conditions, PCAM's predictions could be very accurate.

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Hypercube. The use of the Hypercube model to estimate workload and travel times in response areas was limited to the two "experimental" Baker Bureau teams. The estimates were fairly accurate for the relative workload, although Hypercube tended to seriously underestimate the proportion of inter-area workload. As used, difficulties were experienced in balancing workload and response times in response areas with very different characteristics. A better balance among units might have been obtained by drastically reducing the number of response areas (to five or six for example) and by assigning extra officers to areas with high workloads. Such a strategy would have produced in some response areas with much higher workloads than others, but by varying the number of officers assigned to an area, field commanders could have balanced the workload among units better than the present system allows. This strategy would also tend to increase the integrity of response areas by reducing inter-area dispatches. This would have also had a favorable impact upon travel times by, in most cases, reducing distances traveled and dislocation of officers from their assigned response areas.

Computer designed work schedules. The speed and convenience of the micro computer have been its most appreciated characteristics. When calls for service are used as a workload indicator, it helps match workload to deployment. It is even more valuable when used with PCAM's estimates of actual car requirements on each day and shift.

How many teams? One objective which the Charlotte Police Department hoped to achieve by participating in the MPO project was to evaluate the impact upon patrol performance of revising its fifteen team structure. In general, the differences in performance levels for six teams compared with fifteen teams seem to be fewer and less marked than originally predicted. The single greatest impact upon reducing the number of teams is to increase team integrity and, consequently, accountability by reducing cross team dispatching. Obviously, consolidating several teams into one automatically redefines certain unit movement as intra-team rather than inter-team. Likewise, team consolidation will reduce variations among team performance levels; this does not mean extremes will be eliminated but rather they will be averaged within larger areas rather than being distributed among smaller ones. Similarly, fewer but larger teams eliminates the extremes in supervision levels among the teams. Since sergeants are distributed among fewer teams, the fewer number of teams will always have at least one sergeant on duty for each shift. Therefore, fewer teams pro-

vides constancy of command within a team.

Call prioritization. Expanding the call priority structure from only emergency and routine to emergency, immediate, routine, and referral (see expeditor unit) had a definite and positive impact on the department's ability to manage its field resources. First, the reprioritization lowered the number of emergency calls by slightly more than 2.5 percent. While the total number of calls in January through March 1980, increased by 1,610 over the same period in 1979 the number of emergency calls decreased by 337. The routine calls may be delayed for up to 50 minutes before being dispatched. This priority allows a dispatcher to hold cars in reserve for higher priority calls and accounted for 52.6 percent of the total workload from January through March 1980. By exercising the option to delay some of the large volume of routine workload, dispatchers have helped to achieve marked improvements in field response time to emergency calls. Average travel time to emergency calls was reduced by 29 seconds to 3.8 minutes after reprioritization. Average travel time to immediate calls (included in routine before reprioritization) was reduced by one minute to 5.6 minutes. Travel time to routine calls averaged 6.9 minutes under the new system. Prioritization also increased the proportion of calls answered within their own team and response areas.

Call prioritization (including referrals to the expeditor) seems to have been one of the most successful components of MPO. The department has improved response times while, during January through March 1980, assigning 25,356 officer hours to directed patrol activity, the

equivalent of 34.8 officers engaged in directed patrol on a full time basis. If a little as one-third of this time can be attributed to call prioritization, the program will have effectively added nearly twenty officers to the patrol force. At an average cost of \$17,058 per officer, this translates to an increase in productivity of over \$340,000.

Expeditor unit. During the first ten months of operation, the expeditor unit has handled 40,669 telephone inquiries and serviced 6,536 walk-ins. Some 7,930 reports were taken, 529 warrants were served, and the paperwork prepared for service by a field unit for another 933 warrants. The caller or walk-in was simply provided with requested information in 26,816 cases. It is estimated that if as little of one-eighth of the expeditors' workload represents work directed from the field, the unit handles a workload equivalent to that of an average patrol team (based upon an assumption of fifteen teams). The expeditor unit is now fully integrated into the department's structure and is one of the most popular innovations to result from MPO.

Crime analysis and directed patrol. The crime analysis and directed patrol components of the MPO project are so closely linked together that they are best seen as stages in the same process. The crime analysis section has been assigned a number of record keeping and administrative reporting functions not related to directed patrol. Other than to state that these functions appear to have enhanced both the quality and coordination of the information flow within the department, these functions will not be discussed in detail here.

The department had set an objective of devoting 25 percent of total officer time to directed activities. In fact, during the first six months of the program, 17.4 percent of total officer time was so devoted. This amounted, however, to 55,104 hours, the equivalent of having 12.6 officers assigned to some form of directed activity every hour of every day for that six-month period. Of that time 12,240 hours were devoted to the implementation of formal directed patrol tactical plans intended to impact upon specific crime problems identified by crime analysis or the teams themselves.

Twenty-three tactical plans for which complete evaluation reports exist were implemented during the first six months of 1980. Of the 18 cases identified by crime analysis, offense levels in the target areas decreased in 14 (77.8 percent), increased in three (16.7 percent), and remained constant in one (5.6 percent). Of the five cases identified by the teams, the offense levels decreased in two (40 percent), increased in two (40 percent), and remained constant in

one (20 percent). Thirty-six arrests and 24 case clearances were directly attributable to directed patrol and another nine arrests and 43 case clearances were indirect products of directed patrol. It appears that Charlotte's directed patrol program has resulted in displacement or dispersment more often than it has in arrests. During the first six months of 1980, crime analysis issued 22 original reports of analysis and thirteen supplemental or follow-up reports. Nineteen of the twenty-two reports resulted in the implementation of a tactical plan.

Although the preliminary results are encouraging, there is still room for substantial improvement in both the crime analysis and directed patrol components of MPO. The crime analysis component is still very young. As existing data bases are improved and new ones created to meet specific crime analysis needs, as new capabilities are developed, and as staff capabilities mature by experience, both the quantity and quality of crime analysis products are expected to increase. The size and skills required of the existing staff also needs to be reviewed. Also, strategic products are needed to provide administrators with input to set patrol priorities and develop long range plans for patrol operations.

The proportion of directed activity time

devoted to tactical, directed patrol should be increased. While the quantity of crime analysis products should be increased, team commanders should take more initiative in originating their own directed patrol plans. They also should be more prompt in responding to crime analysis reports; some teams develop and implement a plan within a day of receiving notification from crime analysis, while others have waited over a month to respond. These long delays are clearly unacceptable. Also, some officer resistance to directed patrol has been encountered due to the increase in direction and corresponding reduction in their discretion to patrol where they please when they please. This resistance may have affected the quality of some of the directed patrol performed, but on the whole it appears that while some officers may not like directed patrol, most understand its logic and they appreciate need for it.

Conclusion

The implementation of the MPO project was a major undertaking considering the vast amount of change it brought about in a relatively short period of time. It was beneficial from at least two aspects: first, it appears to have brought about significant overall improvement in police operations and productivity. More important, howev-

er, was the process underlying the changes which were made: the conscious and detailed self-examination of the department by both its managers and line personnel. There is absolutely no doubt that a better understanding of both the police department and the community it serves resulted from that process. Some existing ideas and traditions were challenged and, in some cases, modified. The MPO process was always challenging, occasionally chaotic and often frustrating.

Today, departmental managers are studying the results of the experiment. The department remains organized as it did under MPO. The decision regarding the number and configuration of teams is pending the outcome of additional PCAM analyses. It is highly probable that the computer designed work schedules, call prioritization, and the expeditor unit will be retained in their present form. Crime analysis will be retained. The concept of directed patrol will most likely be retained although not necessarily in its present form.

Whatever the final outcome, it is safe to say that the department will have benefited from its participation in the MPO project. In the long run, the police department and the city of Charlotte can only benefit from the MPO experience. We believe that other departments can benefit similarly. *

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