LAW ENFORCEMENT MANAGEMENT INSTITUTE

A REPORT ON THE

FUNCTION AND APPLICATION OF THE

CRIME ANALYSIS PROCESS IN LAW ENFORCEMENT AGENCIES

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INTRODUCTION

This paper will explore the process of crime analysis and its functions and applications within law enforcement agencies. The term "crime analysis" has been found to mean different things to different people. This paper will attempt to define the terminology and identify the common applications in the context of modern law enforcement efforts.

Traditionally, police agencies have responded to crime after an offense has already occurred. The common police procedure involves gathering detailed information about the victim, time, and location of the crime as well as details about the offender and the criminal act. Once collected, however, the information is forwarded to a central records repository where it is jealously guarded from inspection. Even the police rarely inspect the data unless a particular need causes an investigator to pull the report.[1]

The development and improvements in communications, computer, transportation and weapons technologies have caused dramatic changes in both police methods and public expectations of police performance. The availability of enormous amounts of information have increased the ability of law enforcement agencies to deliver more efficient police services if that information is properly utilized. To provide optimal police services, law enforcement agencies must make every effort to determine in advance, when and where criminal activity is most likely to occur.[2]

The ability of the police to predict when and where

crime will occur, who the offenders are and how they are operating is a vital function in modern law enforcement. This function is commonly referred to as "crime analysis". Crime analysis provides police agencies with the potential to develop this information if a crime analysis unit is designated, properly staffed, supported and utilized by the department.[3]

While the term "crime analysis" is relatively modern, first appearing in O. W. Wilson's book entitled *Police Administration* in 1963, the basic concept is probably as old as organized law enforcement itself. The early roots of crime analysis are found in the development of the modus operandi technique in England around the turn of the century and later the requirement for traffic analysis as perceived by the Northwest Traffic Institute. In both cases, recognition of the usefulness of relevant information organized in a systematic manner helped to stimulate interest in the development of crime analysis as a formal process.[4]

Since the mid-1960's, police departments in many parts of the country have formed crime analysis units and are taking steps to act in advance of anticipated criminal activity. Many of these units were established as part of the Integrated Criminal Apprehension Program (ICAP), formerly funded through the Law Enforcement Assistance Administration.[5]

Crime analysis is not a new concept. From the beginning of organized policing, police officers have compared crimes for similarities in an effort to link

certain types of crimes with particular suspects. In
virtually every police department, regardless of size,
crime analysis activities of some type are being conducted
in pursuit of departmental goals and objectives.[6] The
principal of crime analysis is to identify problems in the
community that a police department has to deal with.

Simple crime analysis can measure the geographical
prevalence of crime, methods of operation, temporal
patterns, ie., the time of day, week or month that crimes
are committed and a variety of other elements important to
effective policing.[7] As crime shifts from day to day,
season to season, police agencies need to adjust their
manpower, resources, methods and strategies.[8] Crime
analysis works because criminals are habitual in the way
they conceive and carry out their crimes. Criminals act
out the same crime in the same manner time after time.[9]
According to the 1983 Figgie Report, "Since the majority of
street crimes and burglaries are attributable to repeat
offenders who usually work within a short distance of their
residences, police patrols can be made much more effective
if managers and patrolmen can be kept apprised with
accurate details of crimes as they happen."[10]

There are many views on how to achieve greater
effectiveness in delivering police service. Whether
espousing the traditional professional model of policing,
community-oriented policing or problem-oriented policing,
all agree that such efforts must be based on information.
By collecting and analyzing crime data and making analyzed
information regularly available, crime analysis can make

the individual line officer more informationally aware and thus, more effective.[11] But crime analysis is not limited to field operations applications alone. Crime analysis impacts all areas and operations of a police department by refining and distributing useful information. Many police departments have used crime analysis effectively to improve their administrative operations and to make strategic decisions effecting deployment of personnel and resources, patrol beat plans and investigative strategies.[12]

REVIEW OF THE RELATED LITERATURE

Crime Analysis Defined

Depending on the particular agency examined, one might encounter as many different definitions of crime analysis as there are police departments conducting such programs.[13] While sharing the same functional title, some crime analysis units are similar in name only. Individual police agencies tend to have very different ideas about what crime analysis should be, how crime analysts should operate and what they should accomplish.[14]

Before attempting to define what crime analysis is, it might be beneficial to discuss what crime analysis is not. According to Robert Heck:

> "crime analysis is not statistical report activity, uniform crime reporting, Kiwanis and Lions Club luncheon speeches or monthly management reports."

Heck contends that crime analysis is:

> "an art requiring skill and learning; a science requiring a systematic study of information; a technology which puts to use the systematic study of information. Crime analysis should be a top-drawer unit providing timely, useful, relevant information on crimes that can be suppressed by interdiction activities."[15]

Law enforcement professionals define crime analysis in its broadest sense as "occupying an integral part of the decision making process for allocation and deployment of police resources."[16] Crime analysis is an essential ingredient for increasing the effectiveness and efficiency of police services. The crime analyst plays a vital role in turning what might otherwise be "filed" data into an

instrument of change and the basis for a measured, informed
police response.[17]

Crime analysis in support of resource allocation
decisions is the systematic examination of distributions of
crime, calls-for-service, and other problems, all of which
are eventually synthesized into workloads or utilization
factors to determine manpower needs, shift configurations,
and patrol beats. Crime analysis for deployment purposes
is, by design, oriented towards the identification of
short-term crime problems. It includes the collection,
collation, analysis, and dissemination of crime and suspect
pattern descriptions in support of field operational
elements.

Crime analysis is defined, therefore, as a set of
systematic, analytical processes directed at providing
timely and pertinent information relative to crime patterns
and trend correlations to assist operational and
administrative personnel in planning the deployment of
resources for prevention and suppression of criminal
activities, aiding in the investigative process, and
increasing apprehensions and clearance of cases.[18] The
basic applications of crime analysis are to:[19]

- Provide information on levels of crime, patterns of
  crime, calls-for-service, and offender activity so
  that problem areas can be identified and responses
  to these problems considered.
- Increase the number of cases cleared by arrest
  through comparing the modus operandi of arrested
  suspects to other reported offenses.

- Provide intelligence information to investigative personnel concerning MO's that match their caseload of current offenses.

- Provide recommendations on alternative programs, patrol strategies and possible solutions to identified problems for patrol placement and the deployment of special units.

- Provide historical information to decision makers concerning trends and patterns of activities for the purposes of planning, budgeting, deployment and resource allocation decisions.

With a definition of "crime analysis" established, it is important understand the differences in crime analysis practices. These differences will be discussed in the next two sections of this paper.

Formal vs. Informal Crime Analysis

All police departments perform some crime analysis activities. In some departments, these activities are entirely informal. Even in departments with formal crime analysis responsibilities, informal crime analysis still occurs. Because of this, it is useful to define the terms "informal" and "formal" crime analysis.

Informal crime analysis is often performed by police officers as they investigate crime or related events. That is, crime analysis activities are not performed by individuals specifically assigned to that function but are performed by officers in the course of their other activities. For example, a detective investigating a rash

of burglaries might take the time to compare his cases with other similar cases being investigated by other detectives. The officer is a walking crime analyst as he compares his present activities with past activities and the activities of his fellow officers. An officer's experience, however, is limited by the number of hours he works, where he works, and for the most part, his experiences are not well coordinated with the experiences of others.

Informal crime analysis is limited by a number of factors, including:[20]

- the officer's memory retention and past experiences;
- the officer's limited "on duty" availability and interest;
- a tendency to be subjective, biased and not timely;
- an inability to focus on the "big picture" because of a large volume of crime occurrences;
- a longer time to accurately detect a pattern or trend;
- an inability to store data concerning methods of operation integral to certain types of crimes;
- a tendency to focus only on odd, out-of-the-ordinary or sensational crimes; and
- a lack of a system for disseminating analyzed information to other officers.

In contrast to informal crime analysis, "formal" crime analysis is performed when the responsibility for conducting analytic activities in support of police operations has been specifically assigned to a particular

person, group of persons or designated unit.

The advantage of a formalized crime analysis system is that by placing the responsibility for collecting and analyzing relevant information with a specific person or unit, crimes and criminal activities can be viewed through "one set of eyes." Most experts in law enforcement strongly advocate a formal crime analysis function for larger police departments because it allows for:[21]

- More objective analysis of crime, crime patterns, and crime-related departmental activities;
- An established communications link to disseminate valuable information to operational units;
- A systematic method for storing and reviewing crime MO data on a timely basis; and
- The ability to identify patterns, trends, and deployment requirements in a shorter period of time.

When crime analysis is formalized, it can be an important departmental tool for converting regularly collected data on reported crimes and criminal offenders into intelligence information for crime prevention, resource deployment, and offender apprehension actions and strategies.[22]

Manual vs. Automated Crime Analysis

Crimes analysis systems can be categorized into manual, automated or semi-automated systems depending on the extent to which the system depends on computers for the storage and collation of data.

Manual systems, by definition are those which depend on methods of data collection, data storage, data analysis and information dissemination conducted by individuals without the support of electronic data processing equipment.[23] In other words, the crime analysis process is done "by hand" without the aid of computers. Typically, the limitations of a manual system are related to inadequate staffing levels. There is simply too much data to handle.

Conversely, an automated crime analysis system usually means that the crime analysis process is substantially designed around computer storage, collation and inquiry capabilities. Perhaps a more appropriate term for automated crime analysis would be "computer-assisted" crime analysis.[24] A semi-automated system would entail features of both.

Crime Analysis Functions

The process and scope of crime analysis are directly dependent upon the needs, resources, and goals of individual police agencies. In its broadest sense, crime analysis refers to systematic processes which provide information for the allocation and deployment of police resources.

The allocation of police resources focuses on the use of the optimum number of officers required to carry out law enforcement functions and other police services responsibilities. Crime analysis in support of allocation decisions involves the systematic examination of

distributions of crime and service problems, which are combined to determine the total manpower needs of an agency. Deployment of police resources, i.e., decisions regarding the tactical movement and actions of police personnel directed at specific crime problems, is based on the systematic examination of crime data. Crime analysis for deployment purposes is, by design, oriented toward the identification of short-term crime problems. The crime analysis activity supports the assignment of personnel by function and by geographical area such as beats or sectors and selected hours of a work shift aimed at reducing identified crime problems.[25]

Crime analysis can support a number of departmental functions, including patrol deployment, special operations and tactical units, investigations, planning and research, crime prevention, and administrative services such as budgeting and program planning. Crime analysis is used to identify crime patterns and trends, assist operational and administrative personnel in devising strategies for decreasing and preventing criminal activity, and aid in the investigative process.

In the investigative process, crime analysis is especially suited to identifying those offenders who commit many similar crimes and those criminal offenses that recur in patterns. Although some benefits may be attained in analyzing nearly all types of crimes, the crimes selected for extensive analysis are normally based on priority considerations.

The analysis of different crime types is dependent

upon the information available. Important data are crime type, geographical factors, chronological factors, victim target descriptors, suspect descriptors, vehicle descriptors, and property loss descriptors. In addition, there are the specific crime factors which provide the information that usually connects crimes by unique characteristics and identifies modus operandi patterns.

One of the most important functions of the crime analysis operation is to identify crime trends and project criminal activity. Crime analysis can undertake the task of identifying potential crime targets for the deployment of special assignment personnel. The examination of recorded information on frequent crime targets can isolate factors which make these targets attractive to the criminal.

For crime analysis to be effective, the analyzed information must be disseminated to operational personnel. Crime analysis information is disseminated by either formal or informal means. The majority of information disseminated by the analysis section takes the form of structured reports which should be tailored to the police officer's needs and function to increase officer awareness and facilitate short-term special manpower deployment. Less structured reports can be disseminated daily, weekly, monthly, or on an as-needed basis. These reports usually take the form of crime recaps, information bulletins, crime summaries, and analysis section reports.

Because of the complexities of modern law enforcement, many police officers become specialists in a particular

aspect of enforcement. Narcotics agents, traffic
enforcement officers and accident investigators are just a
few of the many specialized positions found in today's
police agencies. Since many officers focus their attention
and efforts within relatively narrow parameters, it is
important that crime analysis products are structured to
take into account the specialized nature of these units.
If the crime analysis unit produces only general crime
analysis products, these special units will have to expend
too much time and energy wading through data that does not
address their specific needs and is essentially useless to
them.

Most police departments that engage in crime analysis
concentrate their efforts on a few of the following basic
functions: crime pattern detection, crime-suspect
correlations, crime forecasts, and resource allocation.
Although each of these functions overlaps with the others
to some degree, each is a separate entity.[26]

Crime pattern detection is probably the most widely
conducted crime analysis function. The main objective of
crime pattern detection is tactical in nature; to identify
similarities among crimes that will aid in successful
police intervention. Crime-suspect correlations refers to
the activity of matching potential suspects with crimes
based on modus operandi, vehicle, and career criminal
information. The basic purpose of crime forecasts is to
identify with exact specificity the future occurrence of
crime. If ever perfected, this function, of course, would
be invaluable in combatting crime; however, such perfection

is not possible. Finally, resource allocation functions as
a guide to administrators in deploying the resources of the
department to achieve agency goals.[27]

Crime patterns are groups of offenses that share
common characteristics. Crimes in a pattern are similar in
certain respects, but they are not necessarily related.
For example, several robberies may be committed in the same
jurisdiction by different suspects. Although the robberies
take place in the same general area and may exhibit other
similarities, different perpetrators may be involved. A
good crime pattern reveals one or more of the following
links among the offenses:

- The same geographic location
- A common type of suspect or method of operation
- A possible crime trend or target potential

For example, robberies may be reported as having been
committed by a white male of medium height and weight, with
long blond hair, dressed in a dark shirt and slacks, and
apparently fleeing on foot. This information might share
general similarities, but it lacks distinct crime
attributes and any number of people could be suspected of
committing the robberies. Distinctive crime patterns can
be separated from crimes that share only general
similarities by the presence of distinct crime attributes.
A more detailed crime report may list the suspect as having
a facial scar and a tattoo of a heart on the back of his
right hand. This information provides a more distinctive
point for comparison among several robberies. A
distinctive crime attribute lends credibility to a crime

pattern and thereby provides a significant investigative lead for police action. Also, the formulation of total suspect information from several related incidents produces a more complete description for operational use.

Several methods or techniques have been developed to detect crime patterns. Use of the technique primarily depends upon the type of pattern being analyzed, the individual preferences of the agency, and the resources available to the department. Pattern detection techniques can basically be categorized into geographic and similar offense applications.

GEOGRAPHIC: In developing geographic crime patterns, the most distinct similarity among offenses is their location of occurrence. While there may be several other similarities, the common location of the offenses is the primary cause for at least their initial identification and grouping. The common location may only be described generally, such as an area within the jurisdiction. The location may be specifically identified, for example by street name, types of businesses, or types of residences. Geographic crime patterns are most frequently identified through record logging or mapping techniques. As crime location information is logged or mapped each day, areas of high crime incidence become readily apparent.

The techniques used for recording and detecting crime patterns generally provide the means for monitoring or updating those same patterns. Pin or spot-mapping procedures, for example, provide a visual representation of changes within a geographical pattern. Since spot maps are

usually updated daily, with new offense locations,
geographical crime patterns are monitored and updated as
part of the daily maintenance routine.

Similarly, tally or logging procedures provide the
same automatic monitoring and updating features, but this
method is less effective if the pattern is not area related
or spans several reporting areas. The addition of new
offenses to a log or tally sheet representing a beat or
reporting area that is currently experiencing a crime
problem would indicate the continuation of the problem. A
lack of new offenses would probably indicate that the
activity has ceased.[28]

The size of a geographical pattern often depends on
the technique used to monitor geographic crime
concentrations. In agencies employing pin or spot mapping
techniques, the exact boundaries of a geographic pattern
can be determined by simply inspecting a map. In agencies
utilizing record logging procedures only, with no
provisions for any visual aids, geographic patterns are
detected by monitoring the increases in crime in the
geographic reporting areas of the city used by the agency
for patrol deployment or statistical data collection (e.g.,
patrol beats, census tracts). Consequently, in such
instances, a geographic pattern is usually defined in terms
of one or more beats or reporting areas.

Geographic patterns typically persist from 2 to 10
days. Therefore, a systematic procedure for recording and
monitoring crime location on a daily basis is mandatory.
Simple, quick techniques for geographic pattern detection

like pin-mapping are therefore often the most advantageous.

SIMILAR OFFENSE: Similar offense patterns are more difficult to identify than geographic patterns because of the need for unique characteristics that establish a definite relationship among crimes. It is therefore important to identify as many specific crime details or related subgroups of offenses as possible. If such identification is not achieved, a conflict will occur trying to match several probable suspects, vehicles, victims, or modus operandi descriptions. As such, the analysis attempt will be confused and distorted information will be developed about the original pattern.

Any suspect information available about a crime pattern should, if it is distinct, be correlated with known offender information to determine the identities of the possible perpetrators. Vehicle information, including vehicle color, make, style, oddities, decals, and license numbers, should be compared with known offender vehicle files, field interrogation records, or traffic citation files to develop possible investigative leads. Similarly, unique or distinct M.O. information can be compared to known offender M.O. descriptions.

CRIME -SUSPECT CORRELATIONS The purpose of crime - suspect correlations is to show a relationship between a suspect and an offense. The correlations may be made by using any number of selected criteria in which unique and distinguishing characteristics, physical identifiers, M.O.'s and various other common traits of offenders are

known. This information is derived from the following
files:

- Known or career criminal file
- <u>Modus operandi</u> file
- Suspect vehicle file
- Field interrogation file
- Arrest file
- Alias file

For example, a suspect may be linked to an offense by the
type of weapon used or by the identification of an
outstanding physical characteristic such as a scar, mark,
tattoo, or deformity.

Crime - suspect correlations can also provide field
personnel with data about known career criminals who live
and operate in the officer's area. The correlations
provide officers with names and photographs of known
offenders, their vehicles, establishments frequented, and
criminal associates.

CRIME FORECASTS

The primary objective of crime forecasts is to
contribute to preventive deployment of officers by
determining where and when the next incidents in a crime
pattern will occur. Once such forecasts are developed,
appropriate manpower can be deployed to counteract and halt
the commission of further related incidents. The
specificity of the forecast (i.e., the nature and size of
the potential target area) often determines the kind of
deployment employed. For example, increased patrol may be

the most appropriate method if deterring criminal activity is desired, whereas stakeout methods would be employed if apprehension was considered likely.

Crime forecasts are largely based on daily crime pattern detection activities. Not every pattern identified, however, yields the consistency of information required for crime forecasting. Even rarer still will be the kind of pattern whose characteristics are rigid enough to allow an individual target to be accurately forecast, for example, a specific convenience store between 9 and 12 p.m.; usually though, the type of store as well as a general area of the city can be forecast, giving several potential targets. There are, nonetheless, patterns for which forecasts can be successfully developed, particularly where there is sufficient quantity and consistency of information.

The credibility of a crime analysis unit suffers when predictions about when and where a specific crime will occur are inaccurate. Prediction and forecasting capabilities require a solid data base, coupled with a high degree of skill.

RESOURCE ALLOCATIONS

The allocation of resources is one of the most basic and routine decisions made by police administrators. Whether such decision-making is aided by advanced deployment methods and management techniques, or it is achieved using "rule-of-thumb" formulas, some decision regarding the deployment of law enforcement personnel is

required each day.

In general, resource allocation and distribution deals with the following issues:

- Mode of patrol and number of officers assigned to each unit

- Location or geographic area of each unit

- Case priority structure

- Number of units assigned to each case

- Particular units which are dispatched and assigned

- Manpower scheduling

Basically, there are six steps undertaken in determining resource allocation and distribution:[29]

- Data collection

- Data tabulation by area, time, day, location, and type of activity

- Determination of work hours

- Development of patrol zones

- Allocation of personnel

- Monitor and evaluate the process

Once administrators have identified the problem areas and the operational objectives and constraints (including budget cost and public relations), then performance measures can be evaluated and considerations given to the allocation of patrol resources.

The following are some typical performance measures related to police resource allocation:[30]

- Workload imbalances

- Response time

- Frequency of preventive patrol

- Apprehension probability

- Nature of geographical area (street mileage, area, impediments to travel, obtainable travel speeds)

- Population density and land use patterns

- Spatial and temporal distribution of calls for service

- Number and type of units required to service calls

- Service times

A discussion of the functions of crime analyis should be followed by a discussion of the crime analysis process.

The Crime Analysis Process

The formal crime analysis process is a five-step sequence of related functions:

- crime data collection

- crime data collation

- crime data analysis

- dissemination of crime analysis product

- feedback and evaluation

STEP 1: DATA COLLECTION

The first step in the process is to gather raw data concerning reported crimes and known or suspected offenders. Generally, such information is generated by radio dispatch cards, crime reports, arrest reports, field contact cards, and other recording documents used by an agency and from secondary sources such as computer-generated data available from other agencies outside the department.[31] Types of data normally collected includes suspect descriptions, methods of operation, time and day of occurrence and location of occurrence.

The information used in the crime analysis process comes from a number of sources. These include sources within the police department, such as patrol, investigations, records, communications, special units, and administration; and sources outside the department, such as other law enforcement agencies, probation departments, corrections, court records, state records, and private organizations.[32]

Most of the crime information collected by a crime analysis section is received from the operational units with the agency. The information is obtained from various reports including offense, supplemental, and arrest reports, as well as field contact reports, special analysis reports, departmental records, and statistical data. In addition to structured reports, there can be additional informal data received from other departmental units within the agency. An important tool of crime analysis is the information collected and reported by patrol officers. Data collection is the first essential step in the crime analysis process: as such patrol officers must recognize the importance of accurate and complete reporting. Each officer should consider himself as part of the crime analysis network both as a collector and receiver of information. The information provided by patrol officers, after being analyzed and compared with other data, is returned to them for action in the field. Most of the crime information collected by a crime analysis section is received from the operational units with the agency. The information is obtained from various reports including

offense, supplemental, and arrest reports, as well as field contact reports, special analysis reports, departmental records, and statistical data. In addition to structured reports, there can be additional informal data received from other departmental units within the agency.

Each officer should consider himself as part of the crime analysis network both as a collector and receiver of information. The information provided by patrol officers, after being analyzed and compared with other data, is returned to them for action in the field.

Data collection is perhaps the single most critical step in the crime analysis process. The crime analyst must be familiar with and have a thorough understanding of all available data sources that can be used to carry out crime analysis responsibilities.

The composite of information that is available and should be of concern to the crime analyst is called raw data. In most police departments, raw data can be collected from:[33]

- primary source documents within the agency
- secondary source documents within the agency
- other law enforcement and criminal justice agencies

Information from any of the above sources must be systematically collected so that meaningful comparisons and analyses can be conducted by the crime analyst. Crime analysis information is only as good as the completeness and accuracy of data collected. Extensive analysis with poor data can be an exercise in futility.

Primary source data consists of information which is

contained in the reports individually prepared by the department's field and investigative units. It needs to be collected by the analyst directly from generated field reports as soon as practically possible after criminal events are reported and investigated. Primary source data is unaggregated, and must be reviewed and systematically compiled by the analyst to fit specific uses. Far and away, this type of information is the major data source for conducting crime analysis.[34]

The utility of crime data contained in primary source documents depends on two essential factors which should be of concern to the crime analyst. They are the <u>timeliness</u> of the data and the <u>completeness/accuracy</u> of the data. The crime analyst can exercise some control over these factors that relate to primary source data as they normally have the opportunity to determine how they will receive it, and during its review, they can decide upon the importance to place upon the data.

Timeliness

Timeliness refers to the speed in which crime analysis information from primary source data can be collected by the analyst after an event has occurred. Delayed receipt of information can seriously decrease the crime analyst's capability to perform analysis activities which will provide meaningful data for day-to-day operations. Specifically, dated information equates with dated analysis.

Crime patterns, identifications of suspect/crime correlations and trend predictions are all affected

negatively when data collection is not conducted as timely as possible. Promptly collected information provides the analyst the opportunity to quickly identify trends or potential problems and formulated an appropriate response for implementation by operational units.

Completeness and Accuracy

The completeness and accuracy of data collected from primary sources should be of major concern to the analyst. The completeness and accuracy of these sources will, in large part, determine the confidence both analysts and crime analysis users have in analysis results and the recommendations made from these results. Conducting analysis with incomplete and/or inaccurate information will likely provide analysis results that do not reflect the real situation in the field. Recommendations and/or responses made because of these analyses are, therefore, most likely to be rejected by operational units as inappropriate. If the recommendations are accepted, they may spur the inappropriate use of departmental resources. Both results can diminish the credibility of the crime analysis program.

Because of the importance of using reliable and accurate information for analysis, crime analysts should devote attention to the quality of the reports used to develop their data base. If important information is determined to be missing or inaccurate in some reports, the analyst may want to identify the originator or contact someone else familiar with the report. However, analysts should not fall into the trap of "grading papers" as this

approach can seriously damage the relationship between the
analyst and the crime analysis users. In the course of
reviewing primary data sources for crime analysis, analysts
can play a valuable role for commanders in terms of
improving the quality of report writing by field personnel,
as well as ensuring the reliability of crime analysis
data.[35]

Secondary data sources provide information from a
variety of statistical reports available both internally
and externally. These reports are typically designed for
specialized purposes other than crime analysis, but may
also be valuable for conducting or supplementing analysis
activities. Analysts, however, have little control over
the accuracy or reliability of secondary data. They
usually do not have the corresponding source reports from
which the data was prepared; and they are not likely to
know the exact criteria used to extract the data from its
source(s). Because of this , secondary source data should
be used with due caution.

The analyst should not forget that crime analysis
involved more than empirical data collection and analysis.
Verbal communications between analysts and the exchange of
information between analysts and operation units are also
valuable information sources for collecting raw data for
crime analysis.[36]

STEP 2: DATA COLLATION

Data collation refers to the step in the process of
transforming raw data concerning crimes and criminal

offenders into an organized format for subsequent comparison and analysis. Collation involves more than the simple storage of information in files. It includes sifting out useless, irrelevant, or extraneous information, arranging of materials so that relationships between crime data elements may be established, and creating a system for rapid retrieval of stored or field information. Collation requires files to be systematically designed so that data can be retrieved in a way that relationships between data elements can be established. The data collation step requires that procedures for the systematic storage, review, and assessment of data be developed primarily through the use of computer capabilities or other manual techniques (e.g., index cards, lists, ledgers, etc.). Integral to the collation step is the selection of crimes and events which will be targeted for analysis and the actual procedures for the recording, maintenance and purging of the data base.

The data collation process needs to be well defined as well as restricted in several respects. Crime data is time sensitive and should be kept only as long as it may be useful. Not all data is useful for crime analysis purposes and it makes little sense to collect and store more information than is practical or possible for the crime analyst to use.[37]

Crime analysis is most effective when applied to the types of criminal offenses where a high probability of recurrence exists. A crime analysis program should direct its efforts toward criminal offenses which are typically

known to exhibit some pattern of occurrence that when identified can assist field units in either the prevention or suppression of crime or the apprehension of a criminal offender. The amount of information collected needs to be carefully weighed against the amount of time required to perform useful analysis. For instance, it is unlikely that an analyst who spends 85% of the time collecting and collating data and only 15% conducting analysis can perform effectively. Thus, to strike a reasonable balance, it is necessary to set forth a specific set of target crimes for which crime analysis should be conducted. The following factors are normally considered in selecting target crimes:

- They are susceptible to analysis.
- They tend to exhibit patterns and trends and are often distinguishable by the MO of the perpetrator.
- Suitable information about these offenses is normally available from primary data sources
- They reflect realistic objectives for enforcement and crime control through crime analysis.

Crimes that typically fit this criteria include: burglary, robbery, sex offenses and auto theft. Murder, aggravated assault and other violent crimes are often not suitable for crime analysis because they tend to be committed in private places and under conditions which limit the ability of the police to address the problem.

STEP 3: ANALYSIS

This step includes assembling and comparing pieces of information which have been collected and placing these

pieces together to show patterns and relationships. The
analysis step in the process is comprised of the activities
conducted by the analyst to systematically assemble,
compare, and examine collected information in a way that
will identify meaningful patterns, trends, problems or
statistical descriptions of activity. The substeps of
analysis include determining what will be examined;
deciding what analysis techniques are appropriate;
retrieving the necessary data from collated information;
interpreting the data and making appropriate conclusions
and recommendations. Common analysis techniques include:
spot mapping, geographic, temporal and similar offense
pattern analysis, and general problem identification.
Statistical methods are frequently used to support the
analysis process.[39]

Analysis involves the extraction of <u>modus operandi</u>
elements from crime reports and the search for and
comparison and identification of as many elements as
possible which link two or more crimes, or a crime with a
specific suspect. Analysis can be used to project future
criminal activity as well as identify potential suspects
for active cases.[40]

Analysis is the process of "making sense" out of
collected and collated data. Analyzed data can be used to
plan patrol strategies, to associate crimes with suspects
and vehicles, and to support planning efforts to improve
police operations.

The analysis process is a creative one. It is a
process which involves the examination of data in an effort

to identify and interpret crime-related problems so that
appropriate departmental responses can be implemented. The
problems that crime analysts must seek to identify from
analysis can be generally characterized by answering the
following questions:[41]

- What kind of problem exists?
- Who is responsible for the problem?
- What is the extent or importance of the problem?
- At what rate has the problem changed?
- Who is affected by the problem?
- Where does the problem exist?
- When does the problem exist?
- What are appropriate police responses?

The principal way the crime analyst answers these
questions is through the identification of crime patterns.
Crime patterns are groups of offenses which share common
attributes or characteristics. The commonality between
these offenses may be such things as time or place of
occurrence, a common suspect or vehicle, or a common MO.
It should be noted, however, that common links between
crimes do not necessarily connote a relationship between
offenses.

Crime analysts will typically be concerned with the
identification of two types of patterns associated with
reported crime events: geographic and similar offense
patterns.

Perhaps the most prevalent task of the crime analyst
is the examination of crime events that occur in the same
defined geographic area. The defined area might be a

neighborhood, a patrol area, a subcensus tract or some
other limited area. Once a geographic commonality is
distinguished for a group of crime events, the analyst can
then seek to answer one or several of the questions
previously mentioned as key to data analysis. For a group
of crimes occurring in the same patrol area, for example,
the crime analyst might pose the following questions:[42]

- Are there more crimes occurring during one period
  of time in this area than other times?
- Do these crimes occur disproportionately at certain
  times?
- Is one particular type of crime more prevalent than
  others in the area?
- Are a number of the crimes in the area
  distinguishable by a common MO or suspect ID?

Once a common geographic link in data is established, the
creativity and initiative of the individual crime analyst
drives the analysis problem identification process.
Examining the volume, mix, and rate of growth of crime in
an area should be a key concern in patrol allocation
decisions, preventive patrol strategies and short range
planning. At the same time, the identification of common
suspects, vehicles, and MO's in a defined geographic area
can assist in criminal apprehensions and support special
enforcement strategies.

Where the examination of geographic patterns first
distinguishes a common location for crime events, similar
offense pattern identification focuses first on examining
common suspects, vehicles, and particularly MO's among

crimes irrespective of location. Once groups of crimes are
identified as having common linkages, the identified crimes
can also be examined to determine if there is also a
geographic pattern among the crimes.

There are a variety of methods available to the crime
analyst to detect geographic and similar offense patterns.
Among the most basic approaches to the geographic analysis
of crime events are "pin" or "dot" maps. The use of a map
where crime-event locations are identified by pins or
adhesive "dots" provides the analyst with a visible
mechanism to recognize geographic trends, volume, and
relationships among and between crime types. At a minimum,
pin or dot maps should indicate the type of crime and the
date of occurrence for each crime depicted.

A subcomponent of geographic analysis is the analysis
of crime events on the basis of the time at which events
occur. This is referred to as temporal analysis. Time
includes the hour, day, week, month and season of
occurrence.[43]

Knowing when crimes have occurred can suggest when
best to deploy personnel resources to apprehend offenders
or when to conduct crime suppression activities. Temporal
analysis can be performed by the analyst in several ways.
Perhaps the most operationally relevant method is through
the use of crime-event mapping, where events are plotted
with the day, date and month of occurrence. With this
method the analyst should be able to observe obvious
similarities in crimes occurring in a particular geographic
area. For instance, the analyst may be able to discern

that particular days of the week appear to be related to increased crimes of some types.

In many ways, similar offense pattern analysis is more complex than the process of determining geographic or temporal patterns. Dot maps and visual analysis of data over a period of time are ineffective techniques for identifying non-geographic patterns. Such analyses cannot be used to identify whether crimes may have been committed in the same manner or whether crime targets are common.

Similar offense patterns are generally identified because the analyst recalls threads of information which indicate some common element sufficient to initiate a search of available data about events or suspects. Similar offense pattern analysis relies heavily on the memory recall of the analyst and the analyst's inquisitiveness and creativity during the review and coding of police reports.

Similar offense pattern analysis is the process of identifying relationships between offenses beyond when and where they occurred. The relationship between offenses may be established because:[44]

- Crime methods (MO's) are the same or similar.
- Offenses involve similarly identified suspects.
- The victim or object of attack are similar.

The utility of identifying similar offense patterns is much the same as geographic analysis. Perhaps the biggest difference is that once an analyst determines a similar offense pattern exists, he/she is more likely to be able to provide field units and investigators with a more detailed picture of:[45]

- Who may be committing the crimes.
- A description of the suspect and/or vehicle.
- How the crimes are being committed.

Because of this aspect of similar offense pattern analysis, results of the process are likely to be particularly valuable to investigators and specialized units in the investigation of problem cases. Once made aware of a similar offense pattern, a commander or supervisor may want to develop uniquely designed strategies to deal with the pattern. As an investigative tool, similar offense pattern analysis may be used to clear crimes after the fact. If a suspect is arrested and is known to have used a particular MO or vehicle or to have targeted a specific area, the crime analyst may be able to identify a series of crimes that fit the pattern, thus providing investigators with information about other events in which the suspect may have been involved.

STEP 4: REPORT DISSEMINATION

Report dissemination is the fourth component step of crime analysis and refers to the methods used to report analysis results to potential users. This element of crime analysis concerns both the format and timeliness with which useful information is presented. Report formats should be tailored to meet the particular requirements of the officers who receive the information whether patrol, investigative, or administrative personnel. The timeliness of the crime analysis report is most important since, to be useful, the information must reasonably coincide with the

problems for an effective impact.[46]

Crime analysis information can be disseminated formally through the use of periodic written reports or informally through frequent and routine contact between the users and the crime analyst. Conceptually, the dissemination process involves the identification of potential users and the selection of appropriate dissemination methods to meet the situation. As mentioned previously in this report, patrol and investigative personnel as well as command personnel are key users of crime analysis products. These users of crime analysis, when well informed, can ensure the application of analysis products in support of the processes of apprehending offenders and clearing cases, planning, supervising, and directing deployment decisions, developing leads for investigative activities, and planning and budgeting for the future of the agency.

The crime analysis report must be objective and must be presented in a way so that conclusions are clearly distinguished from theories. The report should indicate the degree of reliability of the information and identify those factors that underlie the report conclusions. Such discussions may take the form of a listing of common characteristics between a series of crimes which are suspected of being related, or a listing of common characteristics of a crime and the modus operandi of a known offender. In complex cases, a summary of the information may be required.[47]

The crime analysis report must be objective and must be presented in a way so that conclusions are clearly distinguished from theories. The method of disseminating analysis results is likely

to be the most important part of the crime analysis process with respect to the acceptance and use of the crime analyst's work effort. The ability of the crime analyst to summarize and communicate information about criminal activity and clearly distinguish between facts and assumptions in a meaningful report is the key to crime analysis.

The main objective of formulating and disseminating crime information through the reporting process is to provide pertinent data about criminal activity for use in decision-making and in short-term operational planning. The goals of disseminating this information are:[48]

- To enhance preventive patrol efforts by identifying persistent or unique crime problem areas for patrol emphasis.
- To achieve a more effective deployment of existing patrol resources through the early identification of crime patterns and trends.
- To provide information for the development of specific patrol strategies and tactics.
- To assist in the investigative process by correlating and communicating crime occurrences with suspects, suspect vehicles, and unique crime-related MO characteristics.
- To increase the number of cases cleared through arrest.

- To provide a quantitative means for measuring the effectiveness of manpower resources in relationship with calls-for-service demands and crime suppression requirements.

- To furnish trend data for overall planning and crime targeting needs.

- To provide a communication link in disseminating intelligence information between patrol, investigators, district stations, and departmental operations.

Dissemination techniques involving crime analysis "result" information generally fall into two categories: informal and formal.[49]

The informal dissemination of crime analysis information involves the direct personal contact between the crime analyst and the users of analysis information. In some instances, this approach may be preferred since information can be communicated quickly and it allows the analyst to have close visibility and contact with station personnel. Informal dissemination techniques can occur on the telephone, through face-to-face conversation with field personnel, and by attending roll call meetings. Personal contact, if performed regularly and extensively, can also provide the analyst with invaluable impressions and feedback as to the quality of the crime analysis product.[50]

Formal crime analysis dissemination techniques involve the communication of analysis and recommendations through written bulletins, memorandums, summaries and reports. The particular structure of each of the dissemination

techniques depends on the type of information desired to be communicated to various user groups. The structure and frequency of reports is a key decision to be make between the crime analyst and command personnel after extensive discussion with the intended users of crime analysis information.

Commanders and crime analysts should be aware that there may be a tendency to develop and disseminate more written reports than are needed. Providing too many reports, especially reports of no particular significance, is not an effective way to establish the credibility of the crime analysis program.

Crime analysis reporting methods need to reflect far more than the routine comparison of crime statistics. While these reports represent a legitimate crime analysis function, they do not go far enough in providing information for investigative assistance, tactical enforcement planning, and patrol deployment. Although formal crime analysis reports are disseminated in writing, this should not be interpreted as obviating the need to discuss the content of these reports either personally or in a briefing environment (roll call, supervisor meetings, etc.) as often as possible.[51]

STEP 5: FEEDBACK AND EVALUATION

The final phase of the process is the primary link of the crime analysis process. Through supervisory review and formal methods of obtaining critiques from users, the performance of the crime analysts and the analysis program

must be continually evaluated. Modification of the program based on evaluation is essential to maintaining a dynamic and effective operation. Thus, this step requires that evaluation/feedback channels be developed, that the input of users with respect to updating the program be encouraged and formalized, and that crime analysis activities be changed and fashioned on the basis of user needs. Feedback from patrol officers, for example, serves two major purposes. First, the feedback helps to determine whether the report information is of practical value. Second, feedback from field officers aids in identifying and assessing any changes in criminal activities that resulted from action on crime analysis reports. Officer participation is required to make this element of crime analysis effective.[52]

Feedback from users of crime analysis allows the analyst to compare analysis results with field perceptions of problems and it allows the analyst to assess the utility of disseminated products and to determine how improvements can be made in crime analysis products. Feedback can also provide the analyst with an awareness of actions that were taken as a result of a crime analysis report. In sum, the information analysts receive from user personnel regarding crime analysis products are critical to the analyst in order to tailor analysis techniques and products more closely to user needs.

The analyst will receive feedback on the information that is disseminated if open channels of communication with the users of information are established and religiously

maintained. The crime analyst should develop and maintain channels of communication through both personal and written techniques. The analyst should make every effort possible to convey written results personally to crime analysis users and to invite suggestions for improving written products. The focus of this type of communication should be based on soliciting realistic ways to better meet the needs of the department through crime analysis.[53]

There is often a tendency to evaluate crime analysis operations based on the perceived impact of the analysis product on such factors as clearance rates, crime rates, and arrest rates. The determination of a causal relationship between these quantitative factors and crime analysis performance is virtually impossible to isolate. Crime analysts routinely provide operational information to various users, yet they have virtually no control over how that information is actually used. The fact that a suspect was arrested based on information supplied by the analysis unit is no indication of the overall value of crime analysis or the individual analyst. The analysis product is not based on absolute factors, but rather is developed from an information base that is generally incomplete and inconclusive. The analyst simply attempts to gather all available pieces of information concerning a group of offenses in an effort to obtain correlations among the crime elements of each offense. The analyst can never be absolutely sure that a single suspect is responsible for a series of crimes, but can isolate similarities that increase the probability that the offenses are related.

Perhaps the most meaningful evaluation of crime analysis operations is one based upon the ability of the analyst to produce worthwhile and timely products. This type of evaluation is concerned with measuring the use and acceptance of crime analysis information by user groups. Another basis for evaluation might be to determine whether the crime analysis unit is making proper use of all available resources and is employing the appropriate analysis techniques to develop information.[54]

From a management perspective, it is important that the crime analysis unit is judged to be an effective component within the agency. In an era of "cut-back economics", few administrators can justify the existence of an employee or group of employees who do not contribute to the mission of the organization.

Most police agencies find that a large portion of their workload is the result of repeat problems originating from a relatively small number of problem sources. This recognition has resulted in a style of policing referred to as "community-oriented" or "problem-oriented" policing. The focus of problem-oriented policing is to "cure" the problem rather than "treat" the problem. Crime analysis is a base on which police can build in meeting the much wider and deeper demands for inquiry associated with problem-oriented policing.[55]

Problem-oriented policing actually provides an incentive to make much more effective use of the data typically collected as part of crime analysis and to expand beyond the current limited objectives of the most advanced

crime analysis models. This would first require focusing more broadly on all of the problems police handle rather than on just traditional categories of crime. It would require trying to understand the nature of these problems as a basis for critical review of the agency's response, rather than limiting inquiries to narrower operational goals.[56]

Application of Crime Analysis in Crime Prevention

The more common functions of crime analysis have been discussed earlier in this paper. Yet to be discussed is an application of crime analysis that is often overlooked in many police departments. Crime analysis information can be useful in the development of crime prevention programs, strategies and tactics. Quite often, however, crime analysis is overlooked during the program planning process in favor of traditional crime prevention activities such as neighborhood watch and operation identification programs. While traditional programs are of value, crime prevention programs should be designed to provide a bundle of crime prevention services that meet specific community crime problems. Better results could be achieved by using crime analysis products to focus crime prevention activities on clearly defined problems.[57]

Information on crime problems, patterns, and trends should be used to select target crimes for crime prevention much in the same way crime analysis focuses its efforts. Some communities have more problems with crimes against persons than others. Local conditions such as the presence

of boating and recreational areas may generate particular crime problems that can be addressed through crime prevention. Essentially, the problem identification process helps the crime prevention unit to determine the type of business they should be in and the types of services the unit should provide.

A profile of community needs should be forged into a clearly stated mission for crime prevention. Mission statements should place emphasis on a specific bundle of services. Areas of emphasis could include:[58]

- Increased knowledge of prevention methods in specific segments of the public such as the elderly or youth.

- Reduced victimization of persons as the result of stranger-to-stranger crimes.

- Reduced victimization of persons as the result of crimes between people who know each other.

- Reduced losses from crime incurred at residential or various types of commercial premises.

Information from crime analysis that should be utilized during the process of defining the scope of crime prevention programs includes:[59]

- Crimes against persons that take place between strangers, as compared to those that take place between people who know each other.

- Victim profiles for crimes against persons, to include race, sex, age and nature of injuries.

- Settings and objects of intent in crimes against property.

- Seasonal variations in crime problems.

This type of information should be available from pattern alerts and information summaries generated by crime analysis. Crime analysts should be included in

deliberations that take place when identifying the problems crime prevention activities should address.

Once a problem-oriented mission statement has been identified for a crime prevention unit, programs should be designed to directly address those problems. Victim profile information from crime analysis is vital to the program planning process. This information describes the characteristics of the clients a crime prevention unit should serve. These victim profiles should include more detailed information than that which was considered during the process of developing a mission for the crime prevention unit. For example:

- Where do victims of crime against persons and property live and work?

- How can crime prevention information effectively reach these target groups?

- What types of target hardening tactics should be recommended to deal with specific crime problems?

Once crime prevention programs are put in place using crime analysis data, there should be an ongoing flow of information from crime analysis to the community via the crime prevention unit. Creation of this information link to the community serves several purposes, including:

- Reducing fear of victimization

- Increasing crime reporting

- Enhancing the effectiveness of programs like neighborhood watch

Crime analysis information is particularly helpful to members of neighborhood watch groups. Peaks and valleys in the level of interest exhibited by neighborhood watch groups can be minimized through an ongoing flow of crime

analysis information. Crime pattern alerts can provide citizens with descriptions of vehicles and people that should be given special attention in a particular neighborhood. As new problems emerge, neighborhood watch groups can shift their attention to address them.[60]

CONCLUSION

Gone are the days when a police department could simply react to crime and other service problems after the fact. In today's society, the police are being called upon to play a more important role in the community than simply law enforcers. Police officers and police departments must be problem solvers.

Crime analysis should serve as the focal point of any police department's attempts to deal with crime problems. Information resources must be recognized, developed and used efficiently. At a time when almost every law enforcement agency is facing cutbacks of resources, crime control strategies must be well developed and based upon all available information that describes a specific crime problem. Directed patrol programs, crime prevention programs and investigative case management strategies can only be enhanced by effective crime analysis.

When a police department decides to implement a crime analysis unit, a process begins that should change the way people in the organization think about and address crime and security problems. A wide range of organizational changes may be necessary in order to successfully implement and utilize a crime analysis unit.

In all cases, the consumers of the crime analysis product should be involved in the development and implementation of the crime analysis unit. In the end, the goal of crime analysis is not just to do analysis. It is to disseminate information that helps an agency to deal with

crime and security problems by thinking before it acts.

END NOTES

[1] Charley Hill, "Current Practices in Crime Analysis," _The Police Chief_, (April, 1985): 44.

[2] Ibid.

[3] Ibid, 45.

[4] O.W. Wilson and R.C. McClaren, _Police Administration, Fourth Edition_ (New York: McGraw-Hill Book Co., 1977), 175.

[5] Peter Bellmio, "Ongoing Development of Crime Analysis Units," _FBI Law Enforcement Bulletin_, (October,1983): 8.

[6] United States Department of Justice, Law Enforcement Assistance Administration, _Integrated Criminal Apprehension Program - Crime Analysis Systems Manual_, Washington, D.C., April 1977, 1-2.

[7] Richard B. Abell, "Crime Analysis and Community Policing," _Law and Order_, (July, 1989):79.

[8] Hill, 44.

[9] Ibid.

[10] Hill, 45.

[11] Abell, 80

[12] Ibid., 81.

[13] United States Department of Justice, Law Enforcement Assistance Administration, _Crime Analysis in Support of Patrol_, Washington D.C., August 1977, 48.

[14] Bellmio, 10.

[15] Robert Heck, "The Management of Criminal Investigations," _The National Sheriff_, (February/March,1982):15

[16] U.S.D.O.J., _Crime Analysis in Support of Patrol_, 57.

[17] Fairfax County Police Department, _Crime Analysis Unit Operations Manual_, Fairfax, Virginia, 1987, 1-2.

[18] U.S.D.O.J., _Crime Analysis Systems Manual_, 1-7.

[19] Fairfax County Police Department, _Crime Analysis Manual_, 1-3.

[20]United States Department of Justice, Law Enforcement
     Assistance Administration, Prescriptive Package:
     Police Crime Analysis Unit Handbook, Washington,
     D.C., 1973, 3-4.

[21]Ibid.

[22]Ibid., 4-6.

[23]Ibid., 5-3.

[24]International Association of Chiefs of Police, Crime
     Analysis, Training Key 13:291, Gaithersburg,
     Maryland, May 1979, 13.

[25]Ibid.

[26]Ibid., 14.

[27]Ibid., 15.

[28]Ibid., 16.

[29]Ibid., 17.

[30]Ibid.

[31]I.A.C.P., Crime Analysis, 14.

[32]Ibid.

[33]Fairfax Police, Crime Analysis Manual, 2-2.

[34]Ibid., 2-3.

[35]Ibid., 2-4.

[36]Ibid., 2-21.

[37]Ibid., 3-1.

[38]Ibid., 3-3.

[39]I.A.C.P., 14.

[40]Ibid.

[41]Fairfax Police, 4-1.

[42]Ibid., 4-3.

[43]Ibid., 4-10.

[44]Ibid., 4-22.

[45]Ibid.

[46]I.A.C.P., 14.

[47]Ibid., 15.

[48]Fairfax Police, 5-1.

[49]Ibid., 5-2.

[50]Ibid.

[51]Ibid., 5-3.

[52]I.A.C.P., 15.

[53]Fairfax Police, 5-12.

[54]Ibid., 5-13.

[55]Herman Goldstein, Problem-Oriented Policing, New York, 1990, 37.

[56]Ibid., 38.

[57]Lawrence J. Fennelly and Peter Bellmio, Handbook of Loss Prevention and Crime Prevention, Second Edition, Boston, 1987, 646.

[58]Ibid., 647.

[59]Ibid.

[60]Ibid., 648.

BIBLIOGRAPHY

Abell, R. P., (1989, July). Crime analysis and community policing. Law and Order, pp. 79-85.

Analysis of crime produces arresting results. (1986, May). Law and Order, pp. 26-28.

Anthony, J. E., Future of Crime Analysis in California Law Enforcement, California Commission on Peace Officer Standards and Training, Sacramento, California, 1986.

Arbogast, K. (1983, August). Ohio agencies create regional crime analysis system. Law and Order, pp. 62-64.

Ault, R. L., Jr. (1986, December). NCAVC's research and development program. FBI Law Enforcement Bulletin, pp. 6-8.

Bates, S., Spatial and Temporal Analysis of Crime, Illinois Criminal Justice Information Authority, Chicago, Illinois, 1987.

Bellmio, P. (1983, October). Ongoing development of crime analysis units. FBI Law Enforcement Bulletin, pp. 8-14.

Bennett, L. A. (1986, October). Crime analysis: A management challenge. The Police Chief, p71.

Bodnar, A., S. Chang, C. Makres, W. Simms, Crime Analysis System Support - Descriptive Report of Manual and Automated Crime Analysis Functions, International Association of Chiefs of Police, Gaithersburg, Maryland, May 1979.

Booth, W. L. (1979, May). The management function of a crime analysis unit. Law and Order, pp. 28-30.

Box, E. P., and G. M. Jenkins, Time Series Analysis Forecasting and Control, Holden-Day INc., San Francisco, 1970.

Brown, W. J., (1984). CATCH - An analytical approach to criminal apprehension. Canadian Police College Journal, pp. 47-70.

Buslik, M. (1989, January). Dead end for Chicago criminals as mapping hits town. Law Enforcement Technology, pp. 34-35.

Call, R. C. (1989, June). From punch cards to computers: An evolution in crime analysis. The Police Chief, pp. 37-40.

Computer mapping for crime analysis. (1977, February). Systems, Technology and Science for Law Enforcement and Security, p.8.

Cox, L. A., Jr., W. B. Kolender, C. F. Bender, and J. A. McQueeney. (1977, October). The Police Chief, pp. 40-42.

Crime analysis software. (1987, March). Police and Security Bulletin, p4.

Crime analysis system support phase II. (1979, October). Systems, Technology and Science for Law Enforcement, pp. 1-2.

Crime analysis training guides available free from NRTA/AARP. (1982, January). Training Aids Digest, pp. 9-10.

Deaton, S. G. (1984, August). Officer coded report forms. FBI Law Enforcement Bulletin, pp. 16-22.

Depue, R. L. (1986, December). An American response to an era of violence. FBI Law Enforcement Bulletin, pp. 2-5.

Diamond, E. (1981, October 26). New crime analysis system passes first test. Law Enforcement News, pp. 1,6.

DOJ launches violent crime analysis center at FBI Academy. (1984, July 23). Juvenile Justice Digest, pp. 2-3.

Donohue, J. F., (March, 1982). Crime Data Analysis: The Weak Link in Community Crime Prevention Programs. The Police Chief, pp. 41-46.

Douglas, J. E. (1986, December). Criminal profiling. FBI Law Enforcement Bulletin, pp. 9-13.

Draper, N. and H. Smith, Applied Regression Analysis, John Wiley and Sons, Inc., New York, 1966.

Fairfax County Police Department, Crime Analysis Unit Operations Manual, Fairfax, Virginia, 1987.

Farris, J. R., Translating theory to practice: A strategic matrix for police. Journal of Crime and Justice, pp. 23-43.

Fennelly, L. J., and P. Bellmio, Handbook of Loss Prevention and Crime Prevention, (2nd edition). Boston: Butterworths, 1987.

Goldstein, H., Problem-Oriented Policing, McGraw-Hill Publishing Company, Inc., New York, New York, 1990.

Harris, Dale R. (1985, September). Sharing crime analysis techniques and information. The Police Chief, pp. 42-43.

Hazelwood, R. R. (1986, December). The NCAVC training program. FBI Law Enforcement Bulletin, pp. 23-26.

Heck, R. O. (1982, February/March). The management of criminal investigations. The National Sheriff, pp. 8-23.

Heck, R. O., W. Pindur and D. M. Raymond. Role of Crime Analysis in SHO/DI. U. S. Department of Justice Office of Juvenile Justice and Delinquency, Washington, D. C., 1986.

Higgins, G. S. (1982, March). The changing role of patrol. The National Sheriff, pp. 22-25.

Hill, C., (1985, April). Current Practices in Crime Analysis. The Police Chief, pp. 44-45.

Hirshorn, S. I., Criminal Justice Analysis: Participant Guide, Washburn University Department of Criminal Justice, Ann Arbor, Michigan, 1978.

Howlett, J. B. (1986, December). The Violent Criminal Apprehension Program. FBI Law Enforcement Bulletin, pp. 14-22.

Icove, D. J. (1986, December). Automated crime profiling. FBI Law Enforcement Bulletin, pp. 27-30.

International Association of Chiefs of Police, Crime Analysis, Training Key: 13:291, International Association of Chiefs of Police, Gaithersburg, Maryland, May 1979. 1980, pp. 13-17.

IPTM offers new tactical crime analysis micro package. (1986, September). Crime Control Digest, p 5.

Makres, C., A. Bednar, W. M. Simms, and S. K. Chang. Descriptions of crime analysis functions in law enforcement. (1979, July). The Police Chief, pp. 40-43.

McCloud, D. G., A. J. Guertin and S. Hershberger. Investigative practices survey. (1985, September). The Police Chief, pp. 44-49.

McCoy, J. G., Santa Barbara Police Department: Strategic Plan, 1985-2005, California Commission on Peace Officer Standards and Training. Sacramento, California, 1985.

National Advisory Commission on Criminal Justice Standards and Goals, Police, U. S. Government Printing Office, Washington, D. C., 1973.

National Retired Teachers Association and American Association of Retired Persons, <u>Older Persons in Crime Analysis: A Program Implementation Guide</u>, NRTA - AARP, Washington, D. C., 1981.

National Retired Teachers Association and American Association of Retired Person, <u>Simplified Crime Analysis Techniques</u>, NRTA - AARP, Washington, D. C., 1981.

Newport News Police report on targeted crime analysis program funded by NIJ. (1986, January 13). <u>Crime Control Digest</u>, p3.

Sheehan, R. and G. Cordner. <u>Introduction to Police Administration</u> (2nd ed.), Cincinnati: Anderson Publishing Co., 1989.

Spelman, W. <u>Beyond Bean Counting: New Approaches for Managing Crime Data</u>. Police Executive Research Forum, Washington, D. C., 1988.

Springer, D. and R. Tercek. The patrol officer - the key to a computer based crime analysis unit. (1979, November). <u>Law and Order</u>, pp. 56,73.

Stiles, S. <u>Simplified Crime Analysis Techniques</u>. American Association of Retired Persons, Washington D. C., 1981.

The President's Commission on Law Enforcement and Administration of Justice, *Task Force Report: The Police,* U. S. Government Printing Office, Washington, D.C., 1967.

United States Department of Justice, National Institute of Justice, <u>Crime Analysis - A Selected Bibliography</u>, U. S. Government Printing Office, Washington, D. C., June 1980.

United States Department of Justice, Law Enforcement Assistance Administration, <u>Crime Analysis in Support of Patrol</u>, U. S. Government Printing Office, Washington, D. C., August 1977.

United States Department of Justice, Law Enforcement Assistance Administration, <u>Crime - Specific Analysis: An Empirical Examination of Bruglary Offense and Offender Characteristics</u>, U. S. Government Printng Office, Washington, D. C., 1977.

United States Department of Justice, Law Enforcement Assistance Administration, <u>Integrated Criminal Apprehension Program - Crime Analysis Executive Manual</u>, U. S. Government Printing Office, Washington, D. C., April 1979.

United States Department of Justice, Law Enforcement
    Assistance Administration, <u>Integrated Criminal
    Apprehension Program - Crime Analysis Operations
    Manual</u>, U. S. Government Printing Office, Washington,
    D. C., June 1977.

United States Department of Justice, Law Enforcement
    Assistance Administration, <u>Integrated Criminal
    Apprehension Program - Crime Analysis Systems Manual</u>,
    U. S. Government Printing Office, Washington, D. C.,
    April 1977.

United States Department of Justice, Law Enforcement
    Assistance Administration, <u>Review of Patrol Operations
    Analysis: Selected Readings From ICAP Cities</u>, U. S.
    Government Printing Office, Washington, D. C., June
    1978.

United States Department of Justice, Law Enforcement
    Assistance Administration, <u>Prescriptive Package:
    Police Crime Analysis Unit Handbook</u>, U. S. Government
    Printing Office, Washington, D. C., November 1973.

Wafle, M. H. (1984, September 13). An analysis of crime
    analysis. <u>Crime Control Digest</u>, pp. 7-8.

Whisenand, P. M. and R. F. Ferguson. <u>The Managing of
    Police Organizations</u>. Englewood Cliffs (N.J.):
    Prentice-Hall, Inc., 1973. p. 85.

Williams, R. (1986, October). Computerized pin map spots
    crime patterns. <u>Law and Order</u>, pp. 28-31.

Wilson, O. W. and R. C. McClaren. <u>Police Administration</u>
    (4th ed.). New York: McGraw-Hill Book Co., 1977.