The Bill Blackwood
Law Enforcement Management Institute of Texas

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A Case for Enhancing Crime Analysis for Police Agencies through
Geographical Information Systems (GIS)

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An Administrative Research Paper
Submitted in Partial Fulfillment
Required for Graduation from the
Leadership Command College

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ABSTRACT

It is the purpose of this research to reveal the practicality and utility of Geographical Information Systems (GIS) and reveal this particular system's lack of usage, mainly among departments similar to the author's. A survey of Texas law enforcement agencies was conducted that consisted of questions to classify the nominal information to compare and contrast the utilization of GIS among agencies. Thus this research provides a glimpse into the state of crime analysis for agencies in Texas. The results of this project's survey showed some strong links to the utilization of this technology in reference to the size and type of an agency. If the research from this author's survey is any indicator, then there is substantial disparity between the smaller-less suburban agencies and the larger more urban agencies. None of the "Rural" or "Other" agencies reported utilizing GIS technology and only 11 out of all of the 41 (32%) agencies that were surveyed reported having it. The variables of size of the agency and the type of agency (Rural, Suburban, Urban, or Other) were controlled for when necessary. The size of the agencies in the sample had a fairly even distribution with 32% having above 100 officers (designated as large agencies). Twenty-seven percent (27%) had 50-100 officers, (designated as medium size agencies) and the remaining 41% were classified as having fewer than 50 officers (designated as small agencies). Also, forty-one percent of the agencies in this survey reported not having an official crime analysis unit. Yet 100% of the respondents were in favor of crime mapping as a useful tool for law enforcement. What can be inferred from this information is that a significant portion of agencies do not have crime analysis, especially in GIS format.

TABLE OF CONTENTS

Page

INTRODUCTION

In this problem oriented policing era, there is a push to be proactive, to prevent crime from happening and to go "back to the basics." This approach translates to a concerted effort in law enforcement agencies to "get out of their cars" and involve the citizens they are tasked with serving, in the overall effort to reduce crime through problem oriented policing strategies. This is being done with greater use of foot and bicycle patrols, frequent meetings with community groups, along with computerized crime analysis. The police are forming partnerships and identifying problems or potential problems, such as repeat call locations, and making efforts to decrease or eliminate future calls in a patrol officer's designated area of responsibility. Increasingly, the problem-oriented approach is augmented and facilitated by the use of more sophisticated crime analysis data processing such as Geographical Information Systems (GIS).

In the face of all of this change, law enforcement agencies are still finding themselves operating reactively and still being managed by their calls for service, instead of the reverse. A constant throughout the eras of change is the need for agencies to be able to efficiently and effectively handle, process, and disseminate information in a manner interpretable and useful to all of the key stakeholders involved. An important "cog in the wheel" of this information processing is the crime analysis capabilities of the information processing systems of an agency.

As a Texas Peace Officer/Supervisor in a small, modernized, suburban type agency this author seeks to learn: Is the underutilization of Crime Analysis information

unique to his agency or is it a common issue for other similar agencies? It is the purpose of this paper to examine the literature to reveal the practicality and utility of GIS and reveal its lack of usage, mainly among departments similar to the author's. GIS is a computerized mapping system that enables the user to visualize statistical information about a geographical area on a map. GIS allows for different types of information to be combined electronically into one customized map.

In conclusion, the issue to be examined is that GIS technology is under-utilized by smaller suburban and rural agencies. In addition, patrol officers' and their supervisors' expectations are not being met with the current and typical crime analysis practices in suburban/rural agencies. They are favorable to the idea of moving past the inefficient and outdated method of gathering text data on tables, spreadsheets, and sometimes manually sticking pins into maps. More than ever, patrol personnel need to be able to efficiently and effectively utilize crime data to solve problems within their geographic areas of responsibility, and if they are held accountable to do so, then it is incumbent upon agencies and their leaders to ensure they have the right tools to do it. They will be better able to engage in problem oriented policing if crime analysis is presented in a "high tech" crime-mapping format.

Along with the review of literature, this author will conduct a survey of representatives of other agencies. The intended outcome of this research is to support the contention that GIS technology is in fact under-utilized or entirely unknown to smaller suburban and rural agencies. Therefore crime analysis, having yet to be as pragmatically available, is not reaching all of the potential consumers of this information. The field of law enforcement stands to benefit tremendously if crime patterns and trends

can be electronically mapped and more effectively retrieved, analyzed, and disseminated. Thus, they can produce the information- the "lifeblood" needed for solving crime problems.

REVIEW OF LITERATURE

A look into the state of crime analysis in Texas by Creech (2002) revealed that 93% of police departments use some form of computerized records management, but at the time, "only 15% employ a "Major Crime Analyst …but over 83% of the respondents thought that their area would benefit from a crime analysis unit" (p.10). According to the Bureau of Justice Statistics (2001), as of June 1999, local police departments nationwide had 20 in-field computers or terminals per 100 officers, and sheriffs' offices had 15 per 100. In 1999, more than half of all officers worked for an agency where at least some sworn personnel in the field could access information on wanted suspects via in-field computers, and about a third were in agencies where information on prior calls for service at a dispatched location was accessible. In 1999, more than half of local police and sheriffs' dispatch systems were computer-aided, compared to about a third in 1990. Most local police departments serving 10,000 or more residents, and most sheriffs' offices serving 50,000 or more residents, were using computers for crime analysis and crime mapping during 1999. Also in 1999, ninety-two percent of all residents were served by local police departments that provided residents with routine access to crime statistics or crime maps, compared to seventy percent in 1997. Lastly, sixty-two percent of residents nationwide were served by a department that had an Internet homepage in 1999, compared to forty-eight percent in 1997.

The point of discussing these particular elements of recent BJS data is that by now, most agencies have computerized systems as an integral part of their data processing and collection, and they are likely to have some crime analysis capabilities through this. However, it has been the experience and observations of this author as an employee in a small, modernized, suburban agency (approximately 50 sworn officers serving a population of approximately 30,000) that these capabilities need to be enhanced or better utilized. As Brodeur (1998) relates in his evaluation of Goldstein's "Problem Oriented Policing" approach, agencies must be in tune with external output or the quality of services provided to the community. Brodeur (1998) emphasizes that problem solving policing is more than adding programs or tactics it is a department-wide strategy. For Goldstein (1990) it is "a whole new way of thinking about policing that has implications for every aspect of the police organization, its personnel and its operations" (as cited in Brodeur, 1998 p.44).

The work of Harries' (1999), found in the U.S. Department of Justice's publication for the Crime Mapping and Research Center (CMRC) and titled "Mapping Crime: Principles and Practice" is an excellent resource for agencies using or implementing GIS. Harries relates that crime mapping is an integral part of crime analysis. He traced the use of maps back to the first major U.S. police department - the New York Police Department (back to at least 1900). The New York Police department is credited with implementing the first modern police agency in the United States in 1844 (Hale, 1994). This law enforcement mapping originated as large depictions of a geographical area with pins stuck in them.

This method had (and has) serious limitations such as: a) as they were updated the prior crime patterns are lost; b) the raw data can be archived but the maps can not, unless they are photographed; c) the maps are static/ unable to be manipulated or queried; d) they can be quite difficult to read when there are several types of crime, represented by an array of colored pins and; e) pin maps occupy considerable wall space.

Harries credits the development of computers, and the progress of more powerful computers at reasonable prices, with the facilitation of the entry of GIS into law enforcement (and elsewhere). This allowed the cartographic principle to be used on a day-to-day basis (also see Groff and La Vigne, 2001). According to Harries, GIS applications for law enforcement did not take off until the late 1980's and early 1990's. The earlier limitations of computers had for so long limited the appeal of GIS to law enforcement agencies. Finally, it is worth reiterating Harries' contention that:

> To date, large departments have been more likely to adopt the innovation; however, almost any police agency that wants a GIS can have one….and a survey of police departments conducted in 1997…showed that only 13 percent of 2004 responding departments used computer mapping. Slightly more than one-third of larger departments (those with more than 100 officers) did so, but only 3 percent of small units did. On average, departments had used computer mapping for 3.3 years. Crime analysts were the primary users of mapping, with relatively few patrol officers involved. (p. 94)

The trick is to put information into a format familiar to most everyone. This is where maps come into focus, not just any map, but maps derived from the power and capabilities of technologically advanced geographic information systems (GIS).

"Knowledge era workers are more decentralized, empowered, team oriented and non-hierarchical than their industrial-era forebears" (Mazaar, p. 127). Management will have to shift focus from producing goods and services and not forget that "the organization is a community of human beings that is in business—any business—to stay alive" DeGuess in (Mazarr, p.153). There is an increasing need for businesses and/or government entities such as police departments to look beyond mere tradition and intuition. Information must be founded on more than hearsay, rumors, non-scientific methodologies, and an "us vs. them" mindset.

With the growing tendency for governments, especially on the local level to contract out or "out-source" to private firms the delivery of certain services, such as corrections, garbage collection, and fire/EMS protection (Gordon & Milakovich, 1998), government entities are losing their immunity from the prosecution to continue to run programs that are improperly designed and inappropriately directed. Including criminal justice agencies, there is increasing necessity to utilize scientifically based judgments (Cohen, 2000). This includes customers' opinions on overall desirability and the feasibility of programs, services and products delivered. GIS's ability to assist managers with efficient and effective allocation of resources can also be used as a tool in this process.

Ratcliffe and McCullagh (2001) performed an interesting study combining a hotspot analysis with GIS, a hotspot perception survey of police officers, and small focus groups to assess the intelligence dissemination process for high volume crime on three Nottinghamshire U.K. subdivisions. The results of the study titled "Chasing Ghosts" indicated a variable result depending on the crime type explored. The data gathered indicated that police perception of crime hotspots varied considerably with crime type. The most vulnerable areas for residential burglaries coincided with the hotspot analysis over 60% of the time in one subdivision, whereas, another subdivision's was over 90% in this category of crime. In a majority of the cases the perception of operational police differed significantly from the computerized hotspot generation process. Ratcliffe and McCullagh's study also found the lack of consistency with the dissemination facet of crime analysis information to the stakeholders. A major area of concern for the focus group revolved around the issue concerning "intelligence" dissemination. It was noted that the dissemination procedures were unique for each sub-station. The officers involved with this study felt that their knowledge of the crime patterns was directly related to these handling procedures. Furthermore, this was attributed to the officers' feelings about crime and what they perceived as policing priorities. At one sub-station the officers felt that there was less crime than other sub-station areas. For this sub-station, the dissemination process included a briefing by a sergeant who read out the crimes and incidents that had occurred recently. This process contributed to the officers' belief that vehicle crime was sporadic—lacking a pattern, which was contrary to the hotspot analysis using the GIS. Therefore, there was little if any enthusiasm to engage in addressing vehicle crime. The officers tended to

focus more on the "serious" offense of burglary. The focus group pointed out that the divisional intelligence unit rarely provided targets to watch and when they did it was for burglary targets. These officers further made reference to the former system of placing crime locations on a map with pins.

Ratcliffe and McCullagh's (2001) study raised important issues regarding the perception of crime patterns among experienced officers and the dissemination of crime intelligence throughout the ranks. In this study police perception of the "important' but less frequent crime of residential burglary correlated well with the empirical study. However there was less correlation in the areas of vehicle crime or non-residential burglary. Important to this study was the revelation that the current dissemination methods of whiteboards and static text on computers appeared to be insufficient in the dissemination of the data to officers for these types of offenses.

Also revealed in Ratcliffe and McCullagh's (2001) study, was a correlation of bias of the judgment of some officers on the location of hotspots relative to the manner in which a burglary was reported (i.e. a distraught victim) and the location of the incident. It is also interesting that none of the stations in the study displayed crime information spatially. Ratcliffe and McCullagh pointed out that at the time of the survey and focus groups, there were no institutional facilities to display crime distribution in any cartographic manner or spatial context either at headquarters or at the local area command level. Not surprising was Ratcliffe and McCullagh's revelation that there was some difference between the perception survey and the hotspot analysis.

Ratcliffe and McCullagh (1998) engaged in another study of burglary involving GIS. This study was used to suggest that a standard GIS package, searching geo-

referenced crime locations can dramatically improve the time and accuracy of identifying locations prone to become repeat victims of burglary. The method of identifying repeat victimization locations by searching address fields in police records is rapidly becoming outdated with the advent of GIS. Ratcliffe and McCullagh deemed this method to be time consuming and fraught with difficulty associated with inaccurate data entry and variations in address format. Backed with research and based on the premise that the period of highest risk for a repeat burglary is immediately after an initial incident, this study recognizes the utility of GIS as a crime prevention tool. Ratcliffe and McCullagh's study further contributes to the idea that the use of computerized systems for recording police crime data is prominent. However, extraction of data pertinent to the geographical crime distribution and the identification of repeat victims are not. They relate that it appears to be the norm for crime data to be recorded primarily for statistical measurement, and not specifically designed for the purpose of repeat victimizations. They emphasize the problem of finding a method of extracting repeat victimization records accurately and quickly from a crime database. Many extraction methods are known to have conflicts within textual address fields. Adhering to the old adage that "time is of the essence," speed is important because the highest chance of a repeat is in the first few weeks after an initial incident. For police to utilize this information on a practical level the information must be seen to be worth the investment in time and effort.

Ratcliffe and McCullagh (1998) go on to relate that many police forces have access to geographically referenced data through their growing use of GIS. Many agencies have been relatively quick to recognize the advantages of GIS's ability to help

with the deployment of resources. Many agencies are also capitalizing on the inclusion

of geographical reference in the recorded crime data to search for repeat victimization

to phase out text-based database searches. This greatly enhances the chances of an

accurate "hit" when searching for repeat victimization incidents. The study's aim was to

demonstrate that standard GIS software is capable of quickly and accurately identifying

repeat victimization events from "Address-Point" referenced crime data. In this study

the commercial GIS and mapping package, MapInfo was used to study the crime data

of the Nottinghamshire Constabulary. Overall, the utility of this study is found in its

revelation of the potential for using GIS to detect repeat victimization. Also revealed by

the study, is how the accuracy and speed of analysis can be greatly enhanced by

extracting police crime data to a GIS and including advanced "geocoding" directly from

address data. Perhaps the most important observation of the study relevant to the topic

of GIS is that "the use of graphical displays for viewing crime data makes the

information more understandable and therefore accessible to often less technologically

experienced police officers. The graphics make it immediately obvious where the

majority of incidents are taking place…" (p. 654). This enables a more reliable

identification of any unusually high incident rates of burglaries and/or the potential for

repeat victimization in a given area. Thus the use of GIS can provide information

necessary for more accurate targeting of crime prevention resources.

Groff and LaVign's (2001) study drew similar conclusions. However they pointed

out some problems with predicting crime in high crime areas, where criminals are likely

to choose crime due to the overall area and a specific target within an area. They

pointed out that crimes such as burglary in these areas tend to be under reported by

victims and under recorded by police. However, Groff and LaVign pointed out GIS's potential as a decision support *tool* and its ability to take a visual display of data to an inferential level.

Bichler and Gaines (2005) arrived at similar conclusions in their study titled "An Examination of Police Officer's Insights Into Problem Identification and Problem Solving. They pointed out that officers had a tendency to identify specific addresses and sights and disorder crimes such as drug and alcohol consumption, loud noise, partying, and loitering associated with gang activity. The most prevalent response was increased use of conventional law enforcement and patrol techniques. They hypothesized that because officers work the districts, there would be more consistency in problem identification. They determined that querying a small group of officers from each district or beat is not sufficient to develop a comprehensive list of problem locations or hot spots. Bichler and Gaines assert that computer mapping is not a perfect strategy because it has limitations. They suggest a cross-validation approach, which combines various information gathering processes.

METHODOLOGY

Recall that the overarching goal of this paper was to shed light on the utility of a technological advancement that enhances law enforcements ability to engage in crime analysis, and what, if any disparity exists in the ability to gather, process, and disseminate Crime Analysis information –mainly through the usage of GIS? The hypothesis is that GIS is not being exploited among agencies similar to the author's medium size- suburban agency. Large agencies were designated by this paper as

those having above 100 officers. Medium agencies had 50-100 officers, and those having fewer than 50 officers were regarded as small agencies.

In order to further evaluate the disparity in the implementation and usage of GIS, the author surveyed an array of supervisors/administrators from agencies throughout the State of Texas attending the June 2005, Module I, and July 2006 Module II Law Enforcement Management Institute (LEMIT). In order to reveal support or lack thereof for the hypothesis, the respondent's answers were compared and contrasted to explore any gaps and/or similarities.

Due to the relative small sample frame available within the Modules, pure random sampling was not feasible for this survey. The target population was N = 41 students from both modules. Although this may be regarded as a relatively small sample size from the State of Texas, the benefit of this survey is the 100% response rate. Suffice it to say that the modules are made up of representatives from an array of police agencies, mid-level and above supervisors, from around the State of Texas. In order to stave off any social presentation biases that might be created, the names of the respondents and their particular agencies were not required for the survey. The type of agency and size is revealed from questions in the survey to be able to control for these variables. Each question could essentially formulate conjoint relationships that could be further examined and tested for statistical significance. The author acknowledges the rudimentary nature of this study. Nevertheless, any inferential value derived from this paper could be useful to spark further discussion and research beyond the scope of this project. Due to the small sample base and some of the extremes in the differences

between values being examined, the information gathered was analyzed using percentages to illustrate points that support or negate the hypothesis.

The survey consisted of questions to classify the nominal information for comparison and contrast regarding the utilization of GIS among agencies [See Appendix-A for copy of survey]. The first two questions were derived to control for the variables of size of the agency and the type of agency (Rural, Suburban, Urban, or Other) when necessary. As shown in Figure13-1 and 13-2, the size of the agencies in the sample had a fairly even distribution with 32% having more than 100 officers, which this paper will refer to as large agencies. Twenty-seven percent (27%) had 50-100 officers, which this paper has designated as medium size agencies and the remaining 41% were classified as having fewer than 50 officers and will be regarded as small agencies for purposes of this research [See table Appendix-B for raw data on the responses that includes size and type of agency].

Figure 13-1

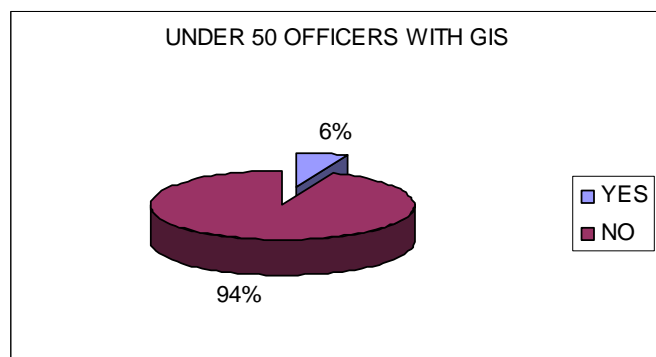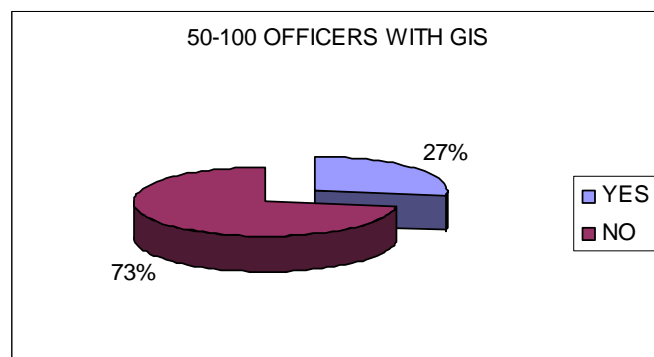| Answers	NUMBER OF SWORN OFFICERS		
A) UNDER 50	17		
B) 50-100	11		
C)ABOVE 100	13		
	41		

Figure 13-2
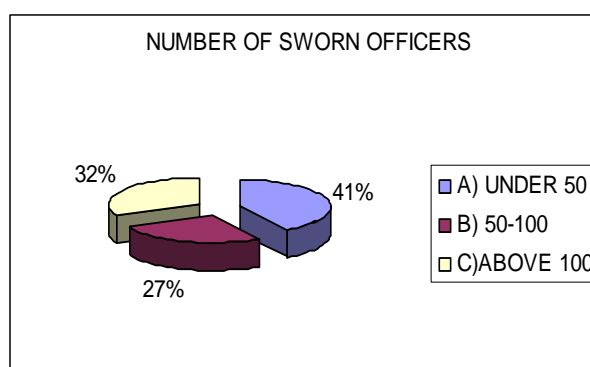
FINDINGS

Without controlling for the type of agency, figure 14-1 represents the small
agency respondents who reported at a rate of only 6% utilization of GIS as compared to
27% utilization from medium size agencies (figure 14-2), and 62% from large agencies
(figure 14-3). When the results of the medium and larger departments are combined
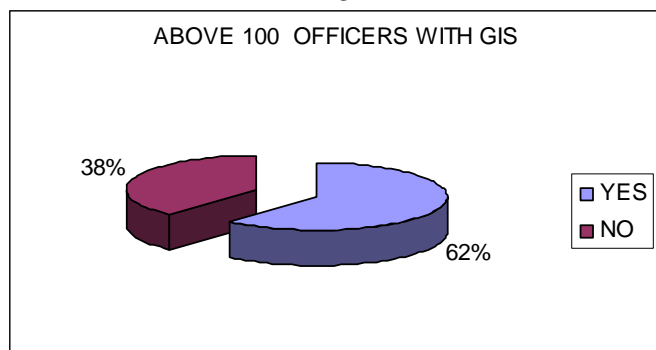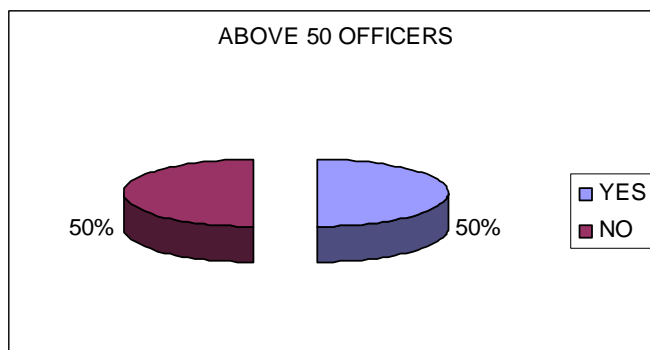the utilization rate is at 50% (figure 14-4).

14-1

UNDER 50 OFFICERS WITH GIS

6%

YES
NO

94%

14-2

50-100 OFFICERS WITH GIS

27%

YES
NO

73%

14-3

ABOVE 100 OFFICERS WITH GIS

38%

YES
NO

62%

14-4

ABOVE 50 OFFICERS

50%   50%

YES
NO

As figures 15-1 and 15-2 represent, the survey of all of the respondents revealed that 61% of the respondents engage in crime analysis and only 41% of the respondents reported having an official crime analysis unit or person.
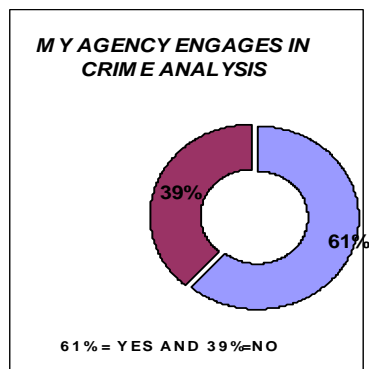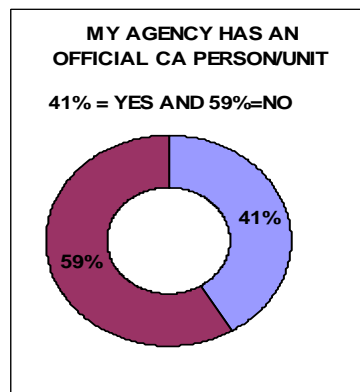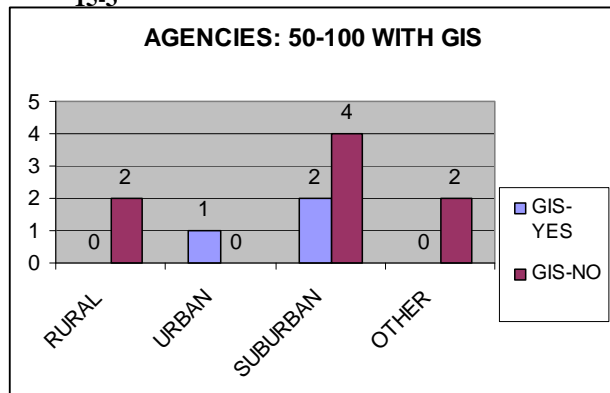
Figure 15-1

MY AGENCY ENGAGES IN
CRIME ANALYSIS

39%

61%

61% = YES AND 39%=NO

Figure 15-2

MY AGENCY HAS AN
OFFICIAL CA PERSON/UNIT

41% = YES AND 59%=NO

41%

59%

Now, the survey inquired into the utilization rate based on the type of agency. As intuition would tell us, and the following graphs (figure 15-3, 15-4, and 15-5) indicate, the larger and the more urban/suburban the agency, the more likely they are to report the having of/utilization of GIS for their crime analysis.

15-4

15-3

AGENCIES: 50-100 WITH GIS

(Bar chart: RURAL: GIS-YES 0, GIS-NO 2; URBAN: GIS-YES 1, GIS-NO 0; SUBURBAN: GIS-YES 2, GIS-NO 4; OTHER: GIS-YES 0, GIS-NO 2)

GIS-YES
GIS-NO

15-5

AGENCIES WITH 100+ OFFICERS

(Bar chart: RURAL: GIS-YES 0, GIS-NO 0; URBAN: GIS-YES 4, GIS-NO 2; SUBURBAN: GIS-YES 4, GIS-NO 3; OTHER: GIS-YES 0, GIS-NO 0; Total: GIS-YES 12, GIS-NO 29)

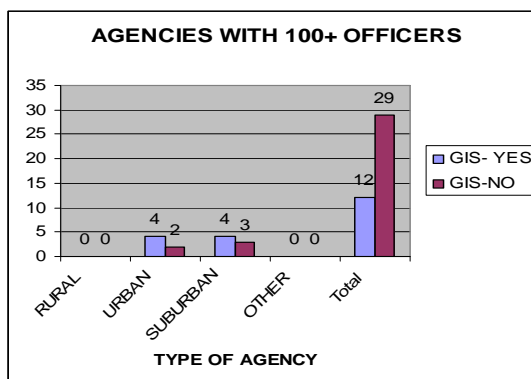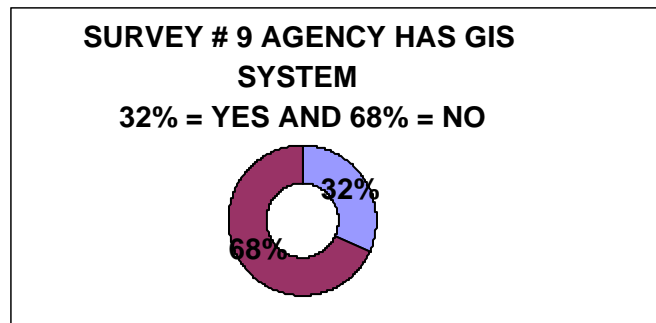GIS- YES
GIS-NO

TYPE OF AGENCY

Figure 16-1 depicts the overall response to the question of whether or not their agency has GIS, which was 12 out of the 41 surveyed, a mere 32%.

Figure 16-1

SURVEY # 9 AGENCY HAS GIS SYSTEM
32% = YES AND 68% = NO

32%

68%

However, as figure 16-2 shows, the respondents were overwhelmingly (100%) favorable to the idea of crime mapping being a useful tool when engaging in crime analysis.

Figure 16-2

SURVEY # 10 CRIME MAPPING IS USEFUL TOOL
NOBODY SAID NO

0%

100%
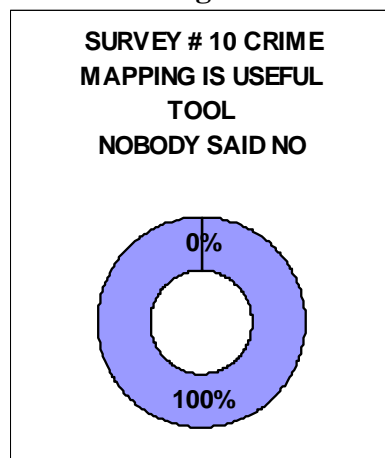
Also, of crucial importance to this research question was how many respondents engage in problem oriented/problem solving policing. Seventy-eight percent of them replied "yes" that they do. Along with this was a 63% "Yes" response that their officers are accountable for crime trends and patterns in particular geographic areas such as beats, districts, or sectors (see figure 17-1 and 17-2).
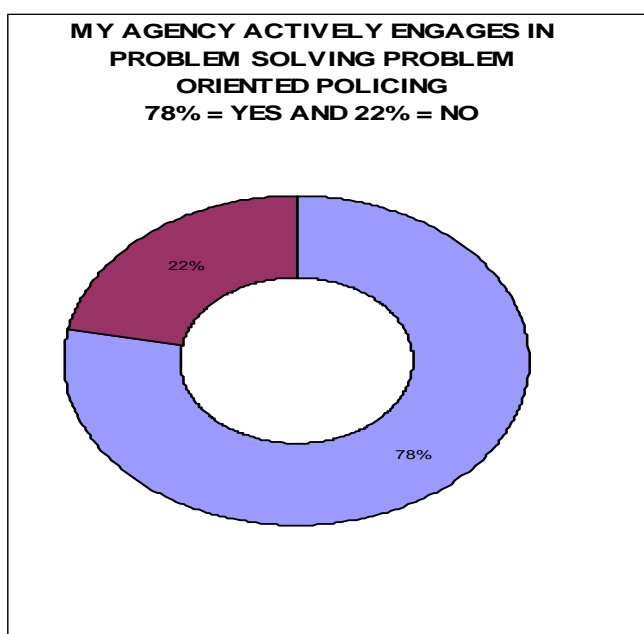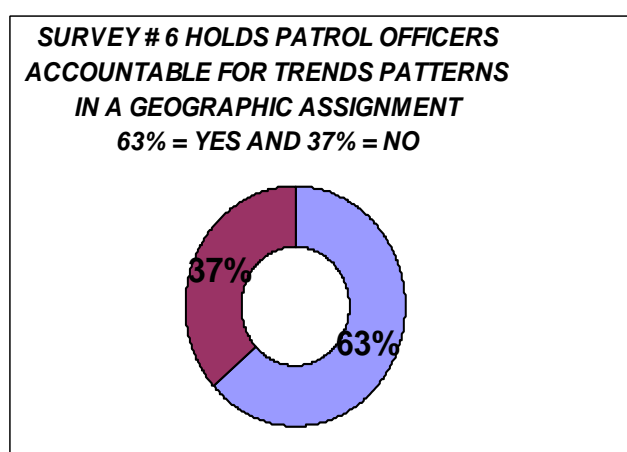
Figure 17-1

MY AGENCY ACTIVELY ENGAGES IN
PROBLEM SOLVING PROBLEM
ORIENTED POLICING
78% = YES AND 22% = NO

Figure 17-2

*SURVEY # 6 HOLDS PATROL OFFICERS
ACCOUNTABLE FOR TRENDS PATTERNS
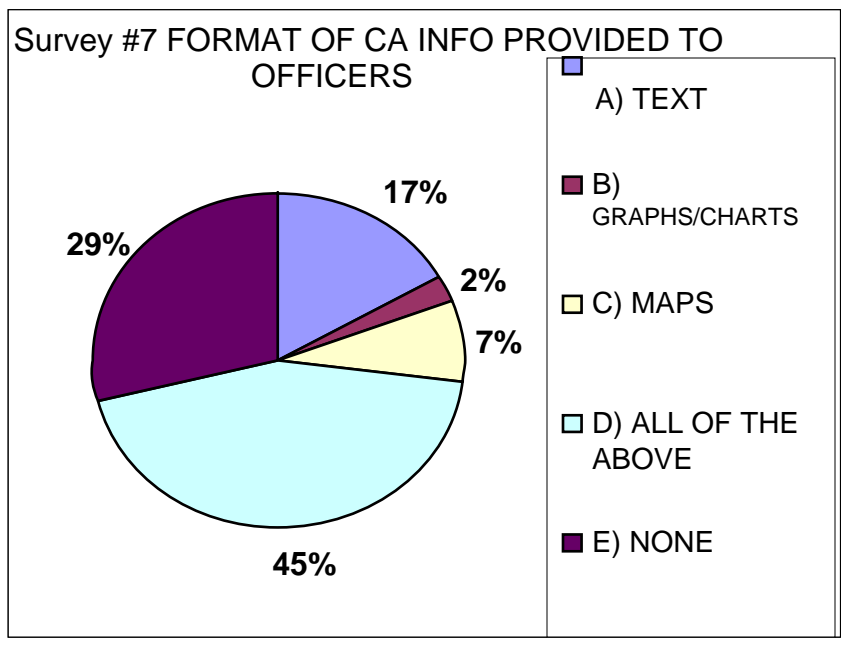IN A GEOGRAPHIC ASSIGNMENT
63% = YES AND 37% = NO*

Survey question number seven (7) attempted to gage the format that officers of the respondent's agencies receive crime analysis information, i.e., text, graphs and charts, maps, all of the above or none of the above. Figures 17-3 and 17-4 depict the results which showed that 45% got crime analysis information in all forms, with a combined 46% receiving it in text and graphs/charts. The remaining seventeen percent receive the information in maps.

A) TEXT	7
B) GRAPHS/CHARTS	1
C) MAPS	3
D) ALL OF THE ABOVE	18
E) NONE	12
	41

Survey #7 FORMAT OF CA INFO PROVIDED TO OFFICERS

- A) TEXT
- B) GRAPHS/CHARTS
- C) MAPS
- D) ALL OF THE ABOVE
- E) NONE

17%
2%
7%
45%
29%

To search for disparity between how the officers receive the data and how they prefer to receive it, question number eight (8) asked them how they would prefer to receive it.   Figure 18-1 shows the raw number of responses to the question and 18-2 shows that eighty-one percent stated "all of the above" formats, i.e., text, graphs and charts, and maps.   When you combine this response "answer" with the number responding with the answer "maps," this translates to 93% of respondents preferring to receive their data in a mapping format.

SURVEY # 8 OFFICER'S PREFER TO RECEIVE CA INFO IN:

2%
5%
12%
81%

- A) TEXT
- B) GRAPHS/CHARTS
- C) MAPS
- D) ALL OF THE ABOVE

Figure 18-1

A) TEXT	1
B) GRAPHS/CHARTS	2
C) MAPS	5
D) ALL OF THE ABOVE	33
	41
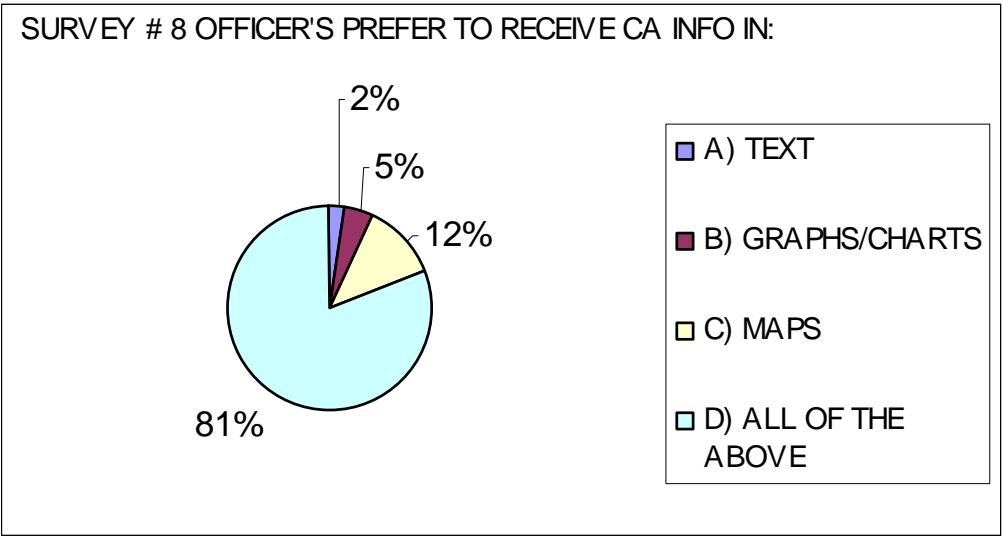
DISCUSSION/CONCLUSION

   The idea for this project can be traced back to so many agencies and their chief's

commitment to the expansion and implementation of the community/ problem oriented

policing philosophy, and the use of crime analysis information toward that end. Watson

and Young's (1992) article refers to the need for the development and utilization of

crime analysis (technical and operational) as one of several implications for change that

is needed to enhance the success of community policing. That was fourteen years ago.

Since then the use of computerized crime analysis has been at the forefront of policing.

The good news is we have another facet of this technology to make it happen.

   Recall that the null-hypothesis is "No matter the size or type of the law

enforcement agency in Texas, the utilization of GIS is similar." The research hypothesis

is that "small to medium size agencies have yet to fully implement the useful resource of

GIS for crime analysis." Drawing from the literature it is easy to see the utility and

necessity of a "high- tech" system to facilitate the plethora of data law enforcement

officers and their managers are being tasked to store, retrieve, and disseminate.

Obviously, the public expects efficiency and efficacy from their government whenever

possible. It is difficult to dispute that GIS offers us a means to achieve this. The results

of this project's survey show some strong links to the size of an agency and their

utilization of this technology. As previously discussed, the Bureau of Justice Statistics

(2001) reports that most agencies now have computers to store and process their data,

and Harries (1999) states that nearly any police agency that wants a GIS can have one.

At that time Harries' cited a 1997 survey that showed that only 13 percent of the

responding departments used computer mapping. Harries' survey revealed that about

one-third of what he referred to as larger departments (those with more than 100 officers) did so, but only 3 percent of small units did.

That begs the question, how far are we on this issue today in Texas compared to 1997, and where are we as smaller to medium size agencies? If the research from this author's survey is any indicator, then much progress has yet to be attained amongst police departments in Texas, especially small/non urban ones. Refer to figures 20-1 and 20-2. None of the Rural or "Other" agencies reported utilizing GIS technology and only 11 out of all of the 41 (32%) agencies surveyed reported having it, albeit this is above the 13% reported by Harries. This project's survey showed five (5) of the agencies that reported to have GIS categorized themselves as Urban and the remaining six (6) identified themselves as Suburban. Totaling these two types of agencies together (Urban and Suburban), this leaves us with 50% of the "haves" -the "urban and suburban" reporting to utilize GIS versus the other 50% of respondents or the "have-nots" - the "rural and other" not having GIS. Finally, only 6% of the respondents who identified themselves as small departments reported having GIS as opposed to 27% of medium agencies and 62% of the large agencies, which shows quite a disparity.
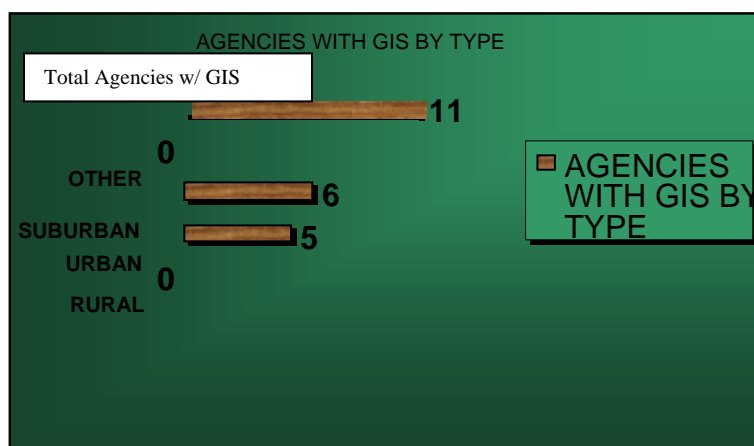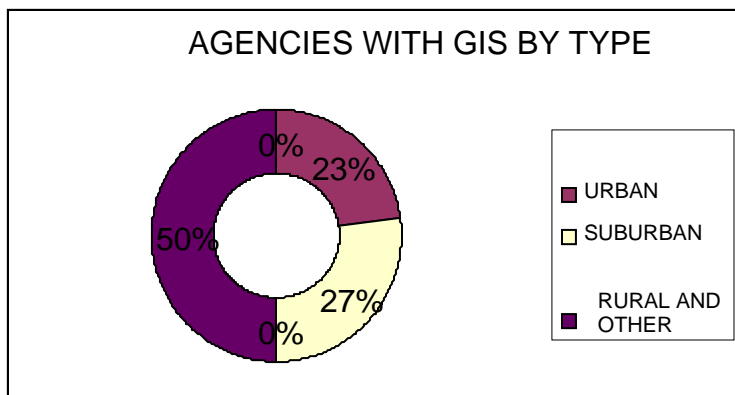
Figure 20-1

Figure 20-2

AGENCIES WITH GIS BY TYPE

Additionally, forty-one percent reported not having an official crime analysis unit. Yet 100% of the respondents were in favor of crime mapping as a useful tool for law enforcement. What can be inferred from this information is that smaller, less urban/suburban agencies, (who are fortunate enough to have any crime analysis capabilities), are likely not getting it in the preferred format by having GIS technology. We all want the information and we see its utility. The majority of the respondents reported assigning their officers to particular geographic areas and holding them accountable for problem solving in those areas. However, we lag behind on maximizing the technology that is out there to facilitate the process.

Some might argue that we do not have crime like the "big city" so we do not need to adopt technology. Then the question is, is this what was said in the advent of computer aided dispatch/ database systems that agencies are now using? What about laptop computers, or radars? The list could go on. GIS is not only helpful with crime statistics, it is also used to monitor trends for traffic problems. Remember the key word is *problem*. Most likely, no matter what size or type of agency, the community you police likely has some problems that take place in a spatial and/or temporal pattern that can be documented, tracked, and analyzed. GIS systems offer an avenue to more easily accomplish this goal, and as the literature suggests, officer intuition is not always the most reliable technique.

Often times it is the lack of money, but some how they all seem to find it. This technology is not all that expensive in the grand scheme of things. At one time, back in 2002 the estimated cost for software compatible with Deer Park Police Department's "New World- Aegis 400" computer system was estimated to be $6000.00, $3120.00 for

installation, and $1360.00 for other maintenance, total of $10, 480.00. The price can

vary with the type of computer technology already implemented by a particular agency,

and there are numerous companies in the business that can be consulted to tailor a

system to fit the needs of that particular agency. There are systems that are

implemented city-wide that involve overlays of the location of fire hydrants, petroleum

pipelines, and a variety of issues regarding public service and public safety. If it can be

plotted on a map, then it can be adapted to a GIS system. Each agency should explore

their needs. With a small amount of research on the World Wide Web, locating a GIS

package should be accomplished with ease. Remember, the idea is to work smarter

not harder and a picture (a map) is worth a thousand words.

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APPENDIX A

1) My agency has _____ sworn officers:
   a) Less than 50   b) 50-100   c) 100 plus

2) My agency is best described as:
   a) Rural   b) Suburban c) Urban
   d) Other   (School /ISD, Hospital, Air Port, etc.)

3) My agency engages in computerized crime analysis.
   Yes   No

4) My agency has an official designated crime analysis unit or division.
   Yes   No

5) My agency actively engages in problem solving/problem oriented policing.
   Yes   No

6) My agency's patrol officers are held responsible for crime trends or patterns in specific geographic areas of responsibility such as beats, districts, or sectors.
   Yes   No

7) My agencies crime analysis unit provides crime data to officers in:
   a. Text data only
   b. Graphs and charts
   c. Maps
   d. All of the above
   e. None of the above

8) I would prefer to have crime analysis information provided to me in
   a. Text data only
   b. Graphs and charts
   c. Maps
   d. All of the above

9) My agency has implemented Geographical Information System (GIS) – (Computerized crime mapping technology).
   Yes   No

10) Crime mapping is a useful tool for patrol officers to analyze crime trends and patterns in their areas of responsibility.
    Yes   No

Comments:

Appendix-B

UNDER 50 OFFICERS WITH GIS	
YES	1
NO	15

50-100 OFFICERS WITH GIS	
YES	3
NO	8

ABOVE 100 OFFICERS WITH GIS	
YES	8
NO	5

ABOVE 50 OFFICERS	
YES	11
NO	11

UNDER 50 OFFICERS	GIS- YES	GIS-NO
RURAL	0	2
URBAN	0	1
SUBURBAN	0	5
OTHER	1	8
50-100 OFFICERS		
RURAL	0	2
URBAN	1	0
SUBURBAN	2	4
OTHER	0	2
ABOVE 100 OFFICERS		
RURAL	0	0
URBAN	4	2
SUBURBAN	4	3
OTHER	0	0
Total	12	29