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Michael Stevenson
Western Oregon University

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By

Michael R. Stevenson

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Dr. Terry Gingerich,
Thesis Advisor

Dr. Gavin Keulks,
Honors Program Director

Western Oregon University

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Introduction

The purpose of this thesis is to provide a comprehensive look into the discipline of crime analysis including the history of the field, history and use of the technology involved in the field, and the training that is required to become an effective analyst. It will also describe what a crime analyst is, what they do, and what makes a good candidate for such a position. Therefore, by gaining knowledge of the many aspects of crime analysis, not only will a better understanding of the discipline will be attained, but it will become easier for agencies to successfully utilize a crime analyst.

The field of law enforcement has grown into an extremely complex line of work with countless areas of specialty and expertise. Crime analysis could be considered the newest addition to the field. While the actual term has been in use since the 19th century, crime analysis has only recently come to be seen as its own discipline in the law enforcement field. However, because it is so new, there are still many issues to be resolved surrounding its widespread implementation and use.

History of Crime Analysis as a Discipline

Though the discipline of crime analysis has not hosted employment opportunities for long, individuals have been conducting crime analysis and have been analyzing behavior for decades. In other words, individuals have always been collecting data about events and have developed ideas about the patterns they were seeing based on those observations. Rachel Boba (2013) provides a great example of this. Take, for example, a cattle rancher from the old American West. This rancher has noticed that he is losing one to two head of cattle from his land every week. These observations and his analysis of them may have led him to respond either by sitting and watching the cattle in that field overnight or by moving the cattle to another field. The rancher's thoughts and actions constitute a simple form of crime analysis. He is using data that has been collected about when and where the cattle are disappearing from to devise a solution to the problem. While this rancher relied mostly on his own observations and his own memories of his cattle being taken, modern analysts have complex computer systems coupled with advanced software to apply these same techniques and many others to analyzing crime. What we consider today as crime analysis represents an evolution of the crime analysis conducted in the example above (Boba, 2013).

The introduction of the crime analysis discipline begins with what has been identified as the first modern police force. This police force was created in 1829 by a man who is commonly identified as the father of modern community policing; Robert Peel. Peel graduated first in his class from Oxford in 1808 with multiple degrees in mathematics, physics and classic literature. Peel made his maiden speech in 1810 following his election to parliament in 1809. This speech was a sensation! Already having started a career in politics and following this speech, Peel began "… a career of social, economic, and legal reform that lasted 40 years" (Lewis, 2011). Peel went on to become Britain's Chief Home Secretary between 1812 and 1818. During this time, Peel built a reputation of having a firm yet compassionate personality.

Following the industrial revolution, London was experiencing through-the-roof crime rates as populations in urban areas rapidly grew. With increasing populations, slums spread rapidly throughout the city turning it into a lawless, dirty and violent area. Many citizens who wanted to prevent crime took matters into their own hands by forming their own disorganized groups, designating individuals to serve as watchmen. Peel liked the strategies the citizens were using. Because Peel was supporting the citizens, they were supporting him and his ideals in turn (Lewis, 2011)

Gaining momentum with the people's support, Peel went on to establish the Metropolitan Police Act (MPA) of 1829. The MPA allowed for the organization of nearly a thousand men who formed the London police force. The creation of the MPA is exemplified in the writings of Anderson (2001):

> In September 29, 1829, the inhabitants of London were witness to a new and impressive, yet imposing sight. Six-hundred uniformed men marched from the back of number Four Whitehall Place onto a little street known as Scotland Yard, with the resolute intent of imposing law and order. Dressed in single breasted blue jackets and tall chimney-pot hats, these "Raw Lobsters" or "Blue Devils" as they were nicknamed, represented a new uniformed police presence on the streets of a soulless city. (77)

Though not universally accepted at first, the effectiveness of this police force gained the trust and approval of the public. This effectiveness led to the creation of the nickname "Peelers." This reference toward Sir Robert Peel soon evolved into the first name reference of "Bobby," which significantly reflects the close association that resulted between the police and their communities. Attributed to the success of Peel are his nine principles of law enforcement; otherwise known today as the Nine Peelian Principles of Law Enforcement.

New Westminster Police Service (2012) regarding the Nine Peelian Principles writes:

- The basic mission for which the police exist is to prevent crime and disorder.

- The ability of police to perform their duties is dependent upon public approval of police actions.
- Police must secure the willing cooperation of the public in voluntary observance of the law to be able to secure and maintain the respect of the public.
- The degree of cooperation of the public that can be secured diminishes proportionately to the necessity of the use of physical force.
- Police seek and preserve public favor not by catering to public opinion but by constantly demonstrating absolute impartial service to the law.
- Police use physical force to the extent necessary to secure observance of the law or to restore order only when the exercise of persuasion, advice and warning is found to be insufficient.
- Police, at all times, should maintain a relationship with the public that gives reality to the historic tradition that the police are the public and the public are the police; the police being only members of the public who are paid to give full-time attention to duties which are incumbent on every citizen in the interests of community welfare and existence.
- Police should always direct their action strictly towards their functions and never appear to usurp the powers of the judiciary.

- The test of police efficiency is the absence of crime and disorder, not the visible evidence of police action in dealing with it.

Through these principles, which are still reflected in policing today, Peel was able to successfully implement a police force which dramatically helped to rid London of a large portion of crime and make it a safer, more enjoyable location to reside.

Despite the newly implemented police force and its success, some crime rates simply could not be reduced. Because some crimes rates were not being reduced, "[t]he London Metropolitan Police established the first detective branch in 1842; the unit became the Criminal Investigations Department (CID) in 1878" (Britannica, 2012). The detective bureau was placed in charge of identifying crime patterns to help solve crimes. Boba (2013) states, "According to London's Metropolitan Police Service (2008), by 1844 the detective bureau's officers were collecting, collating, and analyzing police information". The Metropolitan Police Service in 2008 also noted that there were aggregate crime statistics available for London as early as 1847. The implementation of the Criminal Investigation Department was really the first sign of crime analysis as a discipline.

By the mid-1850s, many large United States cities began creating police departments. However, due to many issues within these departments including corruption and a lack of organization and technology, it was not until the early

1900s that the first real indication of formal crime analysis presented itself, specifically in the United States.

Orlando Winfield (O.W.) Wilson "…created an advanced training program for officers, [and] was the first to mention and define the term *crime analysis*, in the second edition of his book *Police Administrations* in 1963" (Boba, 2013). In a later edition of that book, the distinction between operations analysis and crime analysis was made by Wilson and McLaren (1977) stating that "crime analysis is the 'process of identification of crime trends and patterns through statistical treatment of information and through examination of actual investigative reports'" (Boba, 2013). This shows that crime analysis was being utilized or at least advocated for in police departments by the early 1960s. "However, no evidence of crime analysis products is available from that period" (Boba, 2013).

In another one of his published works, *Police Planning*, Wilson (1952) discusses the implementation of a cartography unit and statistics unit in policing. Wilson notes that the cartography unit will be used to provide technical advice in depicting crime trends or occurrences. Wilson went on to describe the statistics unit as a unit that would disseminate crime statistics and other materials for more efficient operation of departments. Both of these units contained essential functions of what we use in crime analysis today.

Following Wilson's work was the 1968 Omnibus Crime Control and Safe Streets Act. According to the Federal Communications Commission (FCC), Congress noted an increased amount of crime in the United States and this act was thereby created. The increased amount of crime "…threatens the peace, security, and general welfare of the Nation and its citizens" (Hilbink, 2004). To prevent crime and help protect the Nation, Congress recognized that law enforcement efforts need to be better coordinated, intensified, and made more effective at all levels of government. As such, Congress stated:

> It is the purpose of this title to (1) encourage States and units of general local government to prepare and adopt comprehensive plans based upon their evaluation of State and local problems of law enforcement; (2) authorize grants to States and units of local government in order to improve and strengthen law enforcement; and (3) encourage research and development directed toward the improvement of law enforcement and the development of new methods for the prevention and reduction of crime and the detection and apprehension of criminals (Senate & House of Representatives, 1968)

In other words, the goal of this act was to make state and local governments develop action plans for crimes. To help reduce crime, the federal government provided grants to local and state agencies. Furthermore, the Bureau of Justice Administration (BJA) was established with the Omnibus Crime Control and Safe Streets Act. Part of the BJA's task was to help support agencies, provide assistance to the agencies, help to establish evaluation programs, help with providing training and to support the work being done that was being funded by the grants (Boba, 2013).

As a result of the Omnibus Crime Control and Safe Streets Act of 1968, publications from the 1970s about crime analysis, techniques, and crime analysis evaluations began to show that Wilson's advice was being utilized to structure crime analysis. Similar to the conferences that are held annually by world renowned Environmental Sciences Research Institute, or ESRI for short, the 1970s were home to countless symposia by the government on crime analysis. These symposia detailed technical assistance projects geared towards increasing crime analysis capabilities within police departments.

Showing support in the appearance of crime analysis evaluations, a 1972 article published in the *New York Times* noted: "Crime analysts at NYC Police Hq say on July 21 that record 57 homicides in 7-day period that ended at midnight July 20 is attributed partly to hot weather in met area" (July 22, 1972). While this article does not portray crime analysis tactics being utilized, it does make mention that New York City Police had crime analysis personnel, and is thereby evidence of crime analysis ideas being used as early as the 1970s.

In 1979, Herman Goldstein, another policing pioneer, coined the term problem-oriented policing (POP). As opposed to the standard model of policing which incorporates rapid response to calls, increased numbers of police officers and reactive arrest policies among other things, POP takes a very proactive approach to policing. In this model, rather than waiting for calls of service to

come in, police proactively patrol neighborhoods. Also, rather than trying to reduce crime by just responding to incidents and making arrests, police shift focus to identifying, understanding, and responding to problems (Boba, 2013).

The focus of problem-oriented policing is problem solving. In order to achieve effective problem solving, departments must utilize formal analysis to gain a comprehensive understanding of the problems they are facing and to then develop ways of addressing these issues and evaluate what went well and what needs improvement. In coining the term problem-oriented policing, Goldstein was able to really demonstrate how crime can be analyzed.

Crime analysis as a field was gaining much needed recognition in the policing realm and was in no way about to slow its growth. In 1979 the Commission on Accreditation for Law Enforcement Agencies (CALEA) was created. Many agencies learned of this Commission and wanted the accreditation as a way to boost their reputations and capabilities as a department. To achieve accreditation, police agencies were required to have crime analysis capabilities and because of the large desire for accreditation, the likelihood of a department having such capabilities was significantly increased.

As of today, the process to become CALEA certified is a rather lengthy, 2-4 year process that includes application, self-assessment, on-site assessment, and

commission review and decision. Following this, an agency is certified for three years and must remain in compliance with CALEA standards. After submitting a fee, having another on-site assessment and hearing before the Commission, if approved, departments may retain their CALEA certification.

Following this, the Colorado Crime Analysis Association, was formed in 1982 and became the first state crime analysis association to be created. The purpose of the CCAA has been to provide a medium for those in the field to exchange ideas and information regarding crime analysis and to maintain a working relationship with agencies involved in crime analysis. What is now currently the largest state crime analysis organization within the United States; the California Crime Analysis Association was founded in 1989. It is now known as the California Crime Analysts and Intelligence Association and has over 400 members. “CCIAA’s purpose is to promote the exchange of crime and intelligence information and encourage professional development in the analysis field” (CCIAA, 2012). Trumping these organizations is the International Association of Crime Analysts (IACA). IACA began with a small group of well-established analysts from several states and even Canada. From there, it has blossomed into a very well known international organization where analysts can look to for information and resolutions for tough-to-solve problems. IACA holds an annual 5-day conference as well as an international symposium. The last symposium,

which was the Second International Symposium, was held in Den Haag, The Netherlands, and had over 125 attendees from more than 2 dozen countries (IACA, 2011).

Improving upon his own work in 1990, Herman Goldstein further defined the role crime analysis played in the field by emphasizing the use of data and research to identify problems, and understanding underlying causes of problems.

Community –Oriented Policing (COP) is another common strategy of policing. Its theories lie in the belief that by creating partnerships between police and the community through positive interactions, there will be fewer issues in a given area. To aid in reducing crime, the partnerships between police and community often involved the sharing of crime analysis information and statistics.

In 1994, the Violent Crime Control and Law Enforcement Act was put into effect. The Act, according to the National Criminal Justice Reference Service (NCJRS), "…is the largest crime bill in the history of the country and will provide for 100,000 new police officers, $9.7 billion in funding for prisons and $6.1 billion in funding for prevention programs which were designed with significant input from experienced police officers" (NCJRS, 1994). To accomplish the hiring of so many new officers, the Office of Community Oriented Policing Services (known as

the COPS office) was formed. Since 1997, the COPS Office has funded the Police Foundation's Crime Mapping Laboratory (Lab). According to a publication on the COPS Office website, "During this time, the Lab has assisted law enforcement agencies in implementing crime analysis and mapping technology, and provided information on technology and analytical techniques through reports, training, and technical assistance" (COPS, 2002).

As will be discussed later, Compstat was introduced by the New York City Police Commissioner, William Bratton. It was a significant technological advancement for police and law enforcement in general and has continued to provide massive amounts of assistance to the New York City Police Department and countless other agencies around the nation.

The only way all of these technological advances were made possible in the 1990s was through the significant advancements in computer technology. The World Wide Web was launched in the early 1990s, the speed and memory capabilities of computers dramatically increased, and the creation of the Windows operating system created vast new possibilities for the crime analysis field. With all of these advancements in technology, agencies soon discovered electronic data storage to be a great alternative to traditional paper filing systems, specifically because computers are able to store much larger amounts of information in much smaller amounts of space than traditional paper filing

systems. Furthermore, the information is stored in a very centralized location which is great for police and crime analysts. Utilizing electronic storage has made file retrieval and report generating a much less time consuming task because of data centrality.

The 1980s and 1990s were a time when much focus was placed on strategic crime analysis and as part of this, providing police agencies with statistics of long-term trends and ways to combat crime trends. Many of the above mentioned groups, agencies and offices have continued to evolve as time has progressed. Several of these agencies have made extensive progress in the advancement of the field since their creation. For example, ESRI has created software called ArcGIS. This very advanced, professional software kit which starts at $1,500 U.S. for the basic version, has made a tremendously positive impact in the field of crime analysis. ArcGIS has given analysts very powerful tools to use. These technological tools allow analysts to conduct analyses (that would have taken hours in the past) in a matter of minutes. It is innovations such as these that have truly helped to define the field of crime analysis and make it into what it is today.

From the example of the old American West farmer to advanced computer software, the field of crime analysis has made tremendous progress. There have of course been some bumps in the road along the way, but the field has still been

able to flourish. It is still in its early stages and will continue to grow as a discipline in the United States and around the world as computer scientists and criminal justice practitioners continue to find new ways of collecting, storing, interpreting, and portraying data.

Background and Rise of GIS

Crime analysis is an extremely complex field that involves the use of countless forms of technology. However, one of the biggest sources of technology this field utilizes is the computer, and more specifically, Geographic Information Systems (GIS) technology. Crime analysts everywhere rely heavily on GIS. It is their biggest set of tools and probably the most complex. Without it, it's hard to imagine the field being successful today. What exactly is GIS though? Sure, it has something to do with geography, but what is it and how exactly does geography play into this technology and crime analysis as a whole?

Generally speaking, when a person hears the term "GIS", the immediate thought goes to maps. To many nonprofessionals, GIS is a simple term that indicates the use of maps. However, to professionals, GIS is a much more complex topic, and despite the fact that some may be bothered by the mindset of nonprofessionals, it is important for them to realize that thinking of GIS simply as the use of maps is a good starting point. In fact, GIS has developed into its current state as a result of the use of maps for crime research purposes. To understand how this is possible, it is important to gain an understanding of how a GIS is defined. In her text, *Managing Geographic Information* Systems, Nancy Obermeyer (1994) describes a GIS as "…a computerized system for the collection, storage, manipulation (analysis), and output of information that is spatially

referenced". Based on Obermeyer's statement, a simple map can still be considered a GIS.

A map is essentially a non-computerized, manual GIS. To show this, think of a Rand McNally atlas. This atlas was created by a cartographer who has paid attention to specific rules and procedures. This person has then produced an image or set of images which have qualities that map users are familiar with and can readily identify. The maps store spatial data and those that use them, analyze them in order to get from one location to another. The Rand McNally Atlas is a GIS in its most basic form for these reasons

How can a GIS be used as a mapping tool for law enforcement though? To answer this, it is first important to understand what crime mapping is and how it has evolved over the years. While crime mapping plays an integral role in crime analysis today, the creation of crime maps and conduction of spatial analyses have been common for nearly two decades. However, crime mapping has its beginnings back in the 1800s and it would therefore be beneficial to have an understanding of both its historical and present day uses.

In its earliest stages, levels of crime were examined based on regional areas and the relationship of these levels to sociological factors were also examined. "Using criminal statistics for the years 1825 to 1827 and demographic

data from France's latest census, [researchers] developed maps of crimes against property, crimes against persons, and levels of education" (Weisburd & McEwen, 1997). The researchers found that areas with high levels of crimes against property had a low incidence of crimes against people and that higher numbers of educated people lived in areas with more property crime. The research of these individuals and some others was really what began to pave the way for crime mapping.

The use of crime mapping began a little later in the United States than it did in France. This can be attributed to the fact that the United States was still a relatively new country at the turn of the 19th century and accurate and reliable maps of the country were not yet readily available. Also, census data was not yet being regularly collected as it was in Europe. However, the first substantial spatial analysis was conducted in the 1920s and 1930s by sociologists in Chicago (Shawn & McKay, 1969). The work of the sociologists involved in this spatial analysis has been considered one of the foremost examples of crime mapping in the first half of the 20th century. Many sociologists maintained a focus on crime and its causes through the 1950s, 1960s, and 1970s. The methods of geographic analysis throughout this time period remained fairly simplistic which can be attributed to a sociological focus of crime and the lack of technology. However, late in the 1960s, researchers began conducting spatial analysis of crime with the help of

large computer systems and unsophisticated visualization methods (Weisburd & McEwen, 1997).

In the late 1960s and through the 1980s, the focus of crime mapping shifted from the traditional focus of the criminal offender, towards focusing on the actual criminal event and its physical and social environments that helped to create the opportunities for crime. As a result of this, researchers began to include information about geography and environmental factors into their study of crime problems and other related issues like rape. In the early 1980s, client server technology enabled many departments to ramp up their experiments with crime mapping. A project known as “DMAP” (Drug Market Analysis Program) paired researchers and practitioners together to study drug markets and their movement over time. This project was huge in crime mapping as it showed how GIS tools could be used to control crime.

Beginning in the early 1990s, computer technology and police data systems were significantly improved, making electronic crime mapping a much more practical tool for police and researchers. GIS software became available for desktop computers, which can be attributed to advances in computer memory space and processing speed. Computer-aided dispatch (CAD) systems also became available during this time, making police data on crimes, arrests, and incidents available electronically. Furthermore, geographic data such as street

and census information became available to many agencies at either low or no cost. All of these advancements significantly helped to advance crime mapping.

Also in the 1990s, several seminars and other events were held by leading law enforcement agencies, detailing with the use of crime mapping in law enforcement. Many of those who attended these seminars have gone on to become some of the leading researchers and crime analysts in the field today. At the same time, countless police agencies received federal funding that provided support for crime mapping technology and mapping software. One of the most notable programs that were created is known as MORE (Making Officer Redeployment Effective). It has a primary objective of "expand[ing] the amount of time current law enforcement officers can spend on community policing by funding technology, equipment, and support staff" (Office of Community Oriented Policing Services, 2011b). In a matter of 7 years, over $53 million in MORE funding was allocated directly to crime mapping technology. Since this time, many other programs such as MAPS, and CMAP have been developed with goals of supporting agencies in the use of mapping as well as teaching agency personnel beginning and advanced mapping and analytical techniques for purposes of crime and intelligence analysis and GIS.

In 1994, William Bratton, the New York City Police Department Commissioner at the time, introduced Compstat to the NYPD. Bratton's goal was

to make "…a huge organization, legendary for its resistance to change (Sayre and Kaufman 1960), responsive to his leadership- a leadership that had clearly staked out crime reduction and improving the quality of life in the neighborhoods of New York City as its top priorities (Bratton 1999)" (Weisburd, Mastrofski, Greenspan, and Willis, 2004). Further, "Strictly speaking, Compstat refers to a 'strategic control system' developed to gather and disseminate information on the NYPD's crime problems and to track efforts to deal with them" (Weisburd et al., 2004). Compstat has evolved from a simple crime reduction strategy for NYPD to a mapping and data-driven management strategy that is used by countless departments both nationally and internationally. It has helped raise awareness of crime analysis and how it has been incorporated into everyday policing.

With an understanding of how GIS was created, it is possible to focus on how the technology is used as a mapping tool. As previously stated, Obermeyer (1994) notes that the purposes of a GIS are to store information and manipulate the information while maintaining spatial references. While Geographic Information Systems are used for many purposes, creating maps is one of the most common. Known as cartography, map making is a complex line of work that requires a fair amount of knowledge and understanding of spatial data and the ability to understand the aesthetic challenges in creating an effective yet

attractive map or visual. Cartographers must understand the difference between nominal, ordinal, categorical and numerical data as well as different coordinate systems while being able to identify the best ways to visually represent their objective. They also have to understand the complexities that go into certain maps and how they are created; what data goes into them, where the pitfalls of the data are, and where the data excels. In every map, there is some sort of distortion, and though it may not be significant, there will always be some level of distortion in any map you see.

A GIS works with many different applications, giving it a wide variety of uses. In her book *Mastering ArcGIS*, author Maribeth Price (2012) provides an example of just one of the ways a GIS can be used:

> For example, researchers at the U.S. Department of Agriculture Rocky Mountain Research Station in Rapid City conducted a study of elk habitat in the Black Hills of South Dakota and Wyoming by placing radio transmitter collars on about 70 elk bulls and using the collars and a handheld antenna, they tracked the animals and obtained their locations. Several thousand locations were collected for the scientists to study the characteristics of the habitat where elk spend time. (4)

This is just one example of the many ways a GIS can be used as a mapping tool. A GIS can be used in countless other fields including construction, education, transportation, utilities and most importantly, public safety. It a great tool for any professional to have due to the countless number of applications it has.

It has been mentioned previously that a GIS relies on spatial data to operate. In fact, one of the key components of crime analysis is the focus on spatial data, information, and analysis based on the definition Boba (2013) provided. Understanding the spatial aspect of crime analysis is critical to succeeding in such a position. What exactly is spatial data though? Spatial data is data that is represented using coordinates to denote a very specific location. Spatial data can represent information about a point or information covering a specific region. Spatial data is usually measured using x and y coordinate values, and sometimes a z value for height. Latitude and longitude are some of the most used spatial references. Latitude is the x coordinate and longitude is the y coordinate. Due to the need for specifics in crime analysis, spatial data is crucial for the field.

In *Mastering ArGIS*, Price (2012) provides a great example of how a GIS specifically uses spatial data. She uses a fictional local telephone company as an example. In this example, Price recognizes that the accounting department of this telephone company maintains a database with customer information such as name, address, phone number, type of service, etc and "[this] information is only incidentally tied to where customers live; they can carry out most of the important functions (billing, for example) without needing to know where each house is". She states that although the company needs addresses for billing, it is

actually the post office that needs to know where the houses are physically located. This is an example of aspatial data, meaning that the data is only incidentally tied to a spatial location. However, the service department of this telephone company absolutely needs spatial data to operate. For example, when there is a power outage, the company needs to be able to isolate the location of where the outage occurred. In this respect, the telephone company completely relies on spatial information to be able to pinpoint the outage and relay the information to the power company who can then go out to a (spatially referenced) location, and work to restore power to the affected area.

Spatial data is relied upon heavily in today's technologically-based world. GPS devices, CAD systems, and countless other items of technology rely on accurate spatial information. Having this accurate information is vital to the success of police, military and so many other fields of employment. Despite the vitality spatial data has to these areas, it is not the only kind of data that is needed to be successful. As a crime analyst, there are several types of valuable data that can be used and this data can come from several different sources.

There are two types of data that an analyst can use; primary data and secondary data. Primary data is information that is collected for specific purposes directly from individuals or places and is often collected through interviews or surveys. Interviews are useful because they allow the analyst to clarify answers to

questions they are unclear about while surveys are useful because they are far less time consuming than individual interviews, though they can lack in clarity and completeness. Obtaining information from locations can be done through observation. For example, if a local bar is experiencing problems, an analyst can observe the location on different days and at different times (while holding some constants in the experiment) and hopefully find some patterns.

The second type of data that is useful to analyst is secondary data. Secondary data involves information about crime reports, arrests, and calls for service, for example. There are many secondary data sources for analysts to use and a large amount of valuable information can be obtained from these sources. The majority of secondary data sources are databases which house many different kinds of information including data for crime incidents, arrests, calls for service, accidents, persons, property, vehicles, and sex offenders. All of these databases have specific purposes in agencies and all are organized in different manners. While it is great to have all of these different databases, there are some issues with having so many different sources.

All of the information that is in these databases has been manually input by records personnel. While this is to be expected, the vast amount of data that has been input leaves a fairly large margin for error. Humans are obviously not perfect by any means. As such, they make mistakes. It is often the case that a

data entry specialist has made some sort of seemingly unnoticed minor error upon report entry into a records management system (RMS). Even though the error may seem minor to them, it could significantly affect a report that is drafted by a crime analyst. It cannot be stressed enough that reports need to be revised and edited to avoid such problems. A second problem with data entry is that many records specialists do not understand the full scope of crime analysis, and as such, they do not understand how vital any piece of information can be in a report. Due to the wide variety of tasks a crime analyst can be asked to complete, any field of data can be used from a report, meaning that every report needs to be as accurate as possible. Because many reports flow through a chain of people, accurate entry from the first person is vital to maintaining accurate records.

Analysts have a plethora of different sources to obtain data from. If they do not have data they need, they are able to obtain it through interviews or surveys. However, any analyst needs to be aware of and keep in mind that data in any report may not be completely accurate. Anyone involved in data entry needs to do their best to ensure accurate reporting since slight inaccuracies can drastically affect analyses conducted in the future.

Geographic Information Systems have evolved from simple paper maps to the complex software bundles running on the newest available operating systems. As a result of the technological increase in the use of GISs, crime mapping became a

possibility for law enforcement. Starting in France, crime mapping made its way to the United States and really opened the door for crime analysis. Crime mapping has seen a lot of development over the years. It has come from the simplistic version of using census data crossed with crime data and has developed into fairly advanced computing technology that combines historical statistical data and current data to store massive files with a countless number of data points. Being the core of what many analysts do, crime mapping can be considered the backbone to crime analysis. In order for crime mapping to be successful, analysts have to rely on a large amount of primary and secondary data. However, because crime and statistical information generally passes through many hands before an analyst gets to work with it, analysts need to keep in mind that the data may not be completely accurate. Despite this pitfall, crime analysts can almost always achieve their desired goals. Geographic Information Systems have come a long way and have really opened up a new area of expertise in the criminal justice field.

GIS and Its Role in Crime Analysis

Geographic Information Systems have seen significant technological advancements since their introduction. Because of all the advances that have been made to these systems, countless new employment opportunities have arisen in the criminal justice field. Thanks to the advancements in computer technology, GISs have been able to significantly develop since being introduced. Without computers though, Geographic Information Systems would not be as advanced as they are today. Crime analysts would still be using paper maps and push pins to complete their jobs and it is therefore likely that crime analysis would not be the successful field that it is. With all of this technology wrapped up into the field, crime analysis has developed into a multifaceted area of work that has seen significant expansion in its applications in criminal justice. A GIS can be used for a wide variety of tasks in criminal justice. To exemplify this, several different types of analysis have been developed and each one uses GISs in its own fashion. One of the biggest obstacles in crime analysis and the use of GIS is not understanding the technology behind it, but rather it is acquiring and interpreting data; finding good, reliable data that is easy to clean and collate. Once the data is cleaned up and in the proper format, it can be used to solve any number of problems a crime analyst needs to resolve.

According to the author of *Crime Analysis with Crime Mapping*, Rachel Boba (2013), the term crime analysis is often used to broadly describe an entire discipline. Crime analysis includes more than just the analysis of crime, which is why it is sometimes referred to as public safety analysis. Whichever name you choose, understand that there are subcategories under this main heading. These subcategories differ in purpose, scope, data, and analysis techniques and also vary in the amount of data they use. Some types of crime analysis are more have a stronger research focus than others. There are at least six different types of crime analysis in use today and while it is likely there are a few more types, the following six subcategories of crime analysis are those that will most often be utilized by agencies.

The first type of crime analysis to be discussed is intelligence analysis. The International Association of Crime Analysts defines intelligence analysis as the collection and dissemination of information about criminals, particularly organizations and conspiracies. Intelligence analysts look into information about the hierarchy of criminal organizations, flow of money and goods, relationships, current plans and personal information about individuals. Intelligence analysts usually have the goal to arrest, prosecute and convict offenders and much of the information that is gathered through intelligence analysis is done via surveillance, wiretapping, and undercover work. By linking information gathered over the

phone or through conversations, intelligence analysts seek to ultimately convict offenders for their wrongdoings. Intelligence analysts rely on GISs to display relationships of individuals within networks in terms of where they live, work, and frequent.

The second type of crime analysis that is used is criminal investigative analysis. This is one of the lesser known types of crime analysis but it is still used fairly regularly. A bit of history about criminal investigative analysis reveals that the term criminal investigative analyst has not always been used. Before being renamed to this, a person in this field of work was known as a criminal profiler, though not be to be confused with other types of profiling such as racial or sexual. However, because the popular media has skewed the meaning of profiling, the term has since changed to a less misunderstood term, but the work of those who operate as criminal investigative analysts largely remains the same.

A criminal investigative analyst looks at evidence left behind at a crime scene in an attempt to create a profile of the offender(s). Criminal investigative analysts usually work cases involving murder or rape. The analyst examines the crime scene, looking for clues left behind by the offender that might reveal certain information about the person including personality type, social habits, or even work habits. These clues are not necessarily physical clues; rather, these clues are found in analyzing how the scene was left by the offender, and also

what type of action the offender took during the commission of the crime. Criminal investigative analysts may also use a method known as psychological profiling to help solve the crime. According to *Criminal Investigation* by Bruce Berg (2008) “Psychological profiling may be described as a method of suspect identification which seeks to identify a person’s mental, emotional and personality characteristics (as manifested in things done or left at the crime scene)”. Lastly, a criminal investigative analyst can also use what is known as geographic profiling. This type of profiling is a tool analysts utilize that is based on past crimes of a suspected offender. Analysts will look at locations where bodies have been dumped or where people believe they encountered the offender and use the information they gather to geographically identify areas in which the offender is likely to be located. Therefore, a criminal investigative analyst‘s purpose is to help out investigators by identifying personal traits and other information of likely offenders, thereby allowing investigators to affect an arrest on the suspected offender. Criminal investigative analysts rely on GISs to conduct geographic profiling, but that is the extent of their need for a GIS.

A third type of analysis is tactical crime analysis. “Tactical crime analysis is the study of recent criminal incidents and potential criminal activity through the examination of characteristics such as how, when, and where the activity has occurred to assist in pattern development, investigative lead and suspect

identification, and case clearance" (Boba, 2013). Tactical crime analysis focuses on crimes that are recent (having happened in the past 2-3 months) and specific information about the suspects involved. Furthermore, tactical crime analysis relies heavily on police reports as they include information about the crime such as date, time, location, and type of location. Tactical crime analysis is generally conducted in crimes where the offender and victim do not know each other such as burglary, robbery, sexual assault, or theft.

Unlike detectives, tactical crime analysts are able to take a step back and spend some time really analyzing the facts from several cases; searching for a link between crimes to identify offenders. The primary purposes of tactical crime analysis are to link crimes to find patterns, identify potential suspects from these patterns, and to link solved crimes to open cases in hopes of solving the current cases. A tactical crime analyst can rely on GIS software to map out crimes and search for other physical or non-physical characteristics in regards to the locations of the crimes.

The fourth, and possibly most used type of crime analysis is strategic crime analysis. This type of analysis is categorized by the study of long term crime problems and other police-related issues in order to determine long-term patterns of activity as well as to analyze police responses. That being said, the majority of work a strategic crime analyst does is using GIS software to analyze

crime patterns, develop hot spot maps, and discover other problem areas to tend to. This type of analysis makes use of quantitative data; that is, data that is numerical in nature. Examples of quantitative data would include the number of assaults that happened over the course of one year, or how many banks were robbed in the span of three months. A strategic crime analyst utilizes databases with thousands upon thousands of records to conduct analyses. The records mainly deal with date, time, location and type of incident, allowing the analyst to look for patterns and develop maps of certain problem areas.

One of the biggest benefits this type of analysis provides is the ability to determine police response times to crimes. As will be discussed in the section regarding training and personnel, response times to crimes are crucial. Catching a suspect in the process of committing a burglary makes the jobs of police far easier in the long run as it eliminates the need for any detective or investigatory work.

Another benefit to having a well-versed strategic crime analyst is that they are able to quickly identify a perimeter for police to setup to contain a loose suspect immediately following the commission of a crime. If police are searching in an urban neighborhood for a suspect who they know committed an armed robbery at a local convenience store, a strategic crime analyst can quickly draft a map that identifies how of a perimeter police should setup to significantly

increase the chances of capturing the suspect. The numbers of applications for this type of analysis are great, which is why this is the type of analysis that is most often utilized.

The last two type of crime analysis are operations analysis and administrative crime analysis. Operations analysis is the study of a department's practices and policies and is probably one of the least known types of analysis. This study includes the analysis of money allocation, personnel, equipment and other resources. By studying these aspects of an agency, an operations analyst can determine whether or not the agency is operating at its most efficient capacity, and if not, the analyst can identify what changes can be made to increase the efficiency of the agency. This type of analysis primarily focuses on how to better an agency from an operational standpoint and, as an example, can utilize crime mapping to determine geographic allocation of resources (i.e., patrol scheduling) as well as how best to design patrol beats.

The sixth and final type of crime analysis that is often used is administrative crime analysis. "Administrative crime analysis is the presentation of interesting findings of crime research and analysis based on legal, political, and practical concerns to inform audiences within police administration, city government/council, and citizens" (Boba, 2013). The largest difference between administrative crime analysis and the other types of crime analysis is that

administrative crime analysis focuses on the presentation of information rather than pattern identification, statistical analysis, or evaluation. The creation of a crime bulletin for departmental use only is an example of administrative crime analysis. This crime bulletin would likely identify a problematic offender the agency is trying to capture, and would provide incident information as well as contact information for the lead investigator or analyst working the case. Providing information to citizens about a crime spree in a local neighborhood is another example of a task an administrative crime analyst would partake in.

There is a potential risk in such a task though. Victim and offender privacy need to be kept in mind when disseminating such information. If too much information is leaked out in this bulletin, the risk of the suspect fleeing or otherwise disappearing increases. One of the ways police can utilize crime mapping in this type of analysis is through the creation of weekly or monthly online crime maps that allow citizens to see where crimes have been occurring in their local area.

As previously stated, the term “crime analysis” is a term used to describe an entire discipline. There are several subcategories in crime analysis that combine to create the whole discipline. Each one of these categories is very unique and serves a different, but helpful purpose. Some types of analysis are more focused on short-term problems, some are more focused on long-term

problems, and some are focused on how to improve an agency's efficiency. Regardless of its purpose, each subcategory of crime analysis requires the acquisition of and interpretation of data, which is one of the first steps in conducting any analysis. However, retrieving, cleaning and interpreting data is not an easy task.

Historically, data sets were stored locally on individual computers or network drives. However, the expansion of computer technology has changed the way data is stored. More recently, data sets are being stored on Internet accessible files. These files are served within organizations, across organizations, and even to the general public. In the past, data files were stored in clearinghouses sponsored by the National Spatial Data Infrastructure (NSDI) organization (Price, 2012) and often required a significant amount of knowledge, expertise, and the correct software to download and access. Today, however, a majority of available GIS data is accessible with little to no training needed. The data is available through a few clicks of the mouse and is automatically formatted for optimal use by the end user. Unfortunately, when this is not the case, it can be difficult for an inexperienced user to obtain GIS data in their desired format. If the data is not formatted correctly, the software will not be able to interpret it as needed and the analysis project comes to a screeching halt. As such, understanding the makeup of GIS data is critical to completing a project.

GIS data are stored as layers. Each layer represents one type of information such as roads, soil type, elevation, etc. The needs of a crime analyst dictate which layers of data are needed and how accurate they must be. If a crime analyst wants to make a hotspot map of burglaries in a local neighborhood, soil type is not going to be a priority of theirs. A source for every data layer must be located though and oftentimes, data can be found for free. The U.S. Census Bureau has a vast amount of data available for download and is accurate as of the last census for the area in which you need data. However, there are times when data is simply not available for your needs. As a non-criminal justice specific example, a utility company would likely need to develop its own layers to show underground wiring and substations because no one else is likely to have it. Once data is acquired or created, it needs to be checked for accuracy.

The accuracy of data always should be evaluated to ensure it will meet the needs of a project. It is important to keep in mind that any map has some sort of flaw or distortion. An aerial photograph of a hill automatically distorts the actual features of the hill because it appears to be flat in the picture. There are many different types of maps, and each has their own sort of flaw. Real-world objects are often represented as points, lines, or polygons on maps. When looking at the U.S. Map for example, major cities are signified by a point. The city is not actually a circle, but the map shows it to be such. As another example, a river is an entity

that often changes width based on rainfall and other factors. On a map though, a river is often denoted as a polygon with two separate banks and a given width. However, the river will be wider during a rainy period when it floods. There are many examples of how maps are distorted or flawed. Make it a point to keep in mind that maps are flawed.

Once data has been acquired, checked for accuracy, and cleaned, it can then be used to conduct the analysis. Though it is not unusual to encounter small problems during this phase of an analysis project, the majority of the data should be usable and error-free, allowing an analyst to go on to solving the at hand.

Depending on their skill and expertise, crime analysts can solve any number of problems an agency asks of them. A crime analyst can take sociodemographic data from the U.S. Census and create a map showing the layout of the city, identifying where the highest concentrations of Latino residents reside, for example. A crime analyst could make a map pinpointing the locations of a burglary spree in an attempt to predict when and where the next one is likely to occur. There are any number of applications for GIS software and crime mapping.

Geographic Information Systems are far more advanced than they have been in years past. There are constantly evolving techniques and software programs available that continue to create new features in these systems as well

as make them more user-friendly. Being able to understand GISs is one thing, knowing what to do with them is another. Unfortunately, many just believe GISs are simply for making maps and do not understand the full complexity of these systems. Because of this, many agencies just hire someone whose knowledge base involves limited GIS experience. Understanding the greater picture in it all is the key to finding success in the use of GISs. To do that, agencies must understand that the term "crime analysis" is a cover-all for an entire discipline. If an agency manager can understand this, an appropriate hire can be made.

Regardless of the type of analysis being conducted, an analyst must understand the intricacies of acquiring, cleaning, and interpreting data. Not all available data is accurate and chances are high that there will be flaws in a large portion of what is available. Also, data that is available is not always going to be directly compatible with the computer program being used. Therefore, cleaning the data and formatting it to specifications is an important step in the beginning of any project. Once the data is cleaned and formatted, it can be imported. It is at this point that an analyst can start making sense of what they have to work with and how best to display it for others to understand it.

Lastly, it is important for the analyst and their audience to keep in mind that what is being displayed likely contains some sort of distortion or flaw. As the scale of a map increases, so does the distortion of small features. Rivers will

appear to be straighter than they really are, and cities become circles. As long as it is understand that there will be some distortion, no surprises will arise when it comes time to put the data to use.

Geographic Information Systems can be considered the most important tools to crime analysts. Regardless of which type of analysis is being conducted, a GIS is needed. Understanding how a GIS operates and what it is capable of is great knowledge to have. Obtaining data and manipulating it to specific needs is important as well. Analysts need to know where to find the data they need or how to acquire the data if it is not already available. Once the data has been taken care of, it is a matter of working with the GIS software to complete the project and present it for others to understand. GISs are powerful tools and will continue to be a key component in crime analysis.

Training and Personnel Issues

Crime analysis is a field that has been growing significantly for almost three decades now. In this time period, there have been many new developments in the field, helping it to evolve and expand. As the field has grown, so have the number of employment opportunities. Given its fairly rapid expansion and lack of standards and qualification needs, job descriptions for the position of crime analyst have become rather convoluted and unclear. The confusion in what a crime analyst does has caused a lot of uncertainty in the field. This section of research aims to clarify some of the confusion by identifying different uses of crime analysis and the people that work in such positions.

Crime analysis got its start when the American West farmer took steps to resolve his missing cattle problem. Since that point in time though, crime analysis has evolved into the complex field that it is today. Despite all of the changes that the discipline has experienced, one thing has remained constant; the definition of crime analysis. “The definitions of analysis and the role of analysts have largely been ill-defined at best” (Burns & Gebhardt, 2005). The type of work an analyst does with one agency is likely to be completely different from what another analyst working at a different agency would do. To avoid this and to gain some interagency continuity amongst analyst positions, steps should be taken in the early stages of an agency deciding to hire an analyst.

Before an agency begins accepting applications, they must first decide what it is they are looking for in an analyst. Unfortunately, many managers do not understand the differences in the types of analysis that can be conducted and therefore make hiring announcements stating some general crime analysis duties that technically include several different types of analysis. Because there are many different types of analysis, selecting an appropriate type of analysis for an agency is a tricky matter. It involves identifying agency goals and matching those with the skill sets and training of personnel. Finding individuals for the position and reaching an agreement on whether their skill sets are appropriate for the position makes this part of the process much more difficult.

After an agency has decided what kind of analyst they are seeking, the next big decision is figuring out who to hire. Agencies generally have two options; a civilian or sworn personnel. Both of these choices have their benefits and drawbacks. A benefit of hiring a civilian as an analyst is that they have generally sought out training prior to applying for the position. This means that though they are not necessarily experts in the field, they are aware of the different approaches to crime analysis. Unfortunately for the civilian, there is hardly any room for promotion or transfer in such a position making it less appealing to applicants.

The second hiring option an agency can choose is to hire sworn personnel. The benefits of hiring sworn personnel to fulfill the position are ease of transfer, and experience from different perspectives of law enforcement. Some of the drawbacks to hiring sworn personnel include lack of time for training and frequent transfer to different areas within an agency. One might suggest creating a mix of both sworn and civilian personnel to comprise a crime analysis unit within an agency. The biggest problem with creating such a mix of people is funding. Agencies all over are experiencing significant budget cuts, making fund allocation for such a position or unit a very difficult task.

There is a lot of controversy regarding what skill sets and experience combine to make an effective crime analyst. Generally speaking, the opinions that individuals have reflect their own experiences. For example, someone who has a geography degree would likely say that a crime analyst is someone who knows the ins-and-outs of geography and can learn about policing and computers. A crime analyst who is an officer would likely believe that one needs to possess police experience to be a crime analyst. It would be ideal for a crime analyst to possess policing knowledge, research skills, and technological capabilities. However, it is unlikely one person will possess all of these skills, and so these skills are generally learned while working as a crime analyst. As is

evident, selecting a suitable candidate for the position of crime analyst can be a challenging task for any agency.

In their book, “Managing Geographic Information Systems” (1994), Nancy Obermeyer and Jeffrey Pinto provide some thought on desirable skills for a potential crime analyst. For someone to be fully certified, they suggest that the person possess expertise and professionalism. Obermeyer and Pinto suggest that similar to a doctor who must develop mastery of lasers and ultrasound (important medical tools), in GIS, “experts” must also develop mastery of their tools of the trade; computers and their software. It should not come as a surprise that expertise forms the backbone of professionalism. If individuals in a field cannot come to a consensus on what specialized knowledge is required for expertise in the area, the validity of the field as a profession is questioned.

A profession is generally created as a result of an apparent need. When this need arises, it is ideal to have individuals who are knowledgeable on the subject and who are capable of addressing the need. Accomplishing this generally requires extensive academic preparation through which specialized knowledge of the subject is attained. Unfortunately, the field of crime analysis does not have extensive academia that is desired for obtaining such knowledge. Though there are some locations in the U.S. where one can receive GIS and crime analysis training, the opportunities are limited in this fairly new field. Obermeyer and

Pinto emphasize that it is important to have guidelines of what constitutes expertise in a field as well as what identifies a professional field. The field of crime analysis lacks these qualities.

Due to the extensive complexities of trying to find suitable candidates for a crime analysis position, it is obvious that there is a significant need for training standards in the field. It was not until very recently that training became available for crime analysts. For years, analysts were simply self-taught computer gurus who knew GIS and learned how to apply that knowledge to agency needs. Luckily, training programs have begun to sprout up in some locations around the United States. The first of its kind in the nation, the Florida Law Enforcement Analyst Academy (FLEAA), was developed by the Florida Department of Law Enforcement (FDLE) in 2003. Attendees learn criminal and intelligence analysis skills that are used by law enforcement and other emergency responders to successfully prevent crime and conduct complex investigations as well as a variety of other complex analytical skills (FDLE, 2013). Since its creation, the FLEAA has come a long way in advancing the course material and finding ways to better train current and future analysts. Several others state and local agencies have followed in Florida's footsteps, developing their own crime analysis certification programs. The number of law-enforcement-backed programs and university programs is rising around the country. In fact, Western Oregon University is one such

example of a newly developed university program. The program takes you through several computer science courses, criminal justice courses, and GIS courses and provides you with a certificate in crime analysis after completing the two-year program.

With the general lack of training and specific qualifications, the question begs to be asked; is it worth it? Is the cost of hiring, training, paying, and retaining a crime analyst worth it for a department? Regardless of whether the analyst is civilian or sworn personnel, training costs can be steep. In any field of employment, experience can go a long way. Sworn personnel learn the ins and outs of their jobs through experience. Over the years, experienced sworn personnel have learned the areas in a city or town that are known for having high rates of certain crimes. They know where the drug neighborhoods are and where the problematic businesses are. Without advanced computer technology, these individuals are able to recognize these things. That being said, is it worth it for the department to go through the expense of hiring a crime analyst, training them, and purchasing the computer hardware and software for them to be successful in their position? The answer to this question will be different for every agency. A cost-benefit analysis should be conducted to determine if hiring a crime analyst is the best business decision for an agency. Surprisingly, one

department has found a way to avoid these major expenses and has had a lot of success with the program they developed.

The Gardena, California Police Department was able to successfully implement crime analysis and crime mapping into their rather small and very low budget agency. In his article, “Crime Analysis Reporting and Crime Mapping” (2007), Ed Burnett discusses how the Gardena Police Department was able to implement a successful low budget program thanks to their small size, and suggests that agencies of similar size could do the same by using the tips he provides. Burnett notes that a lot of GIS software available today has a lot of add-ons and there is a need to renew an annual license for the software. As opposed to having to purchase this software, Burnett notes that there are several software vendors that sell relatively inexpensive GIS software that will contain enough features for a small department. The only other type of software needed is some report generating software which can also be found at a low cost. Once the software is acquired, the agency then needs to identify what kinds of maps and diagrams are going to be the most beneficial for the crime problem they are studying. Distributing the information is as simple as sending an email, printing it out, or posting it on bulletin boards inside. For this all to be successful, field supervisors need to constantly review and update the information they have available and keep their subordinates informed as well. The success of the

Gardena Police Department is exemplified in the following passage from Burnett (2007);

> One evening, the Gardena, California Police Department received a burglary-in-progress call. Officer arrived at the residence in less than 1 minute, discovered the perpetrator inside the house, and arrested him. Investigators subsequently linked the man to other burglaries in the area. The officers, however, were not in that part of the city by chance; they were on directed patrol duties. The sergeant supervising that shift had studied crime pattern information from crime analysis reports and maps routed to him a short time before the shift's briefing. Upon recognizing a cluster of burglaries in the late afternoon in that specific geographic area, he deployed officers, who in turn, responded immediately to the burglary call. (15)

New programs are being created both nationally and internationally. "[I]t would seem that the crime analysis field is making more progress in training and education of crime analysts than general policing has made in the police leadership arena" (Ratcliffe, 2004). Because so many agencies are unaware of how complex crime analysis is and due to the number of analysts that are self-taught, there is a significant need for these new programs. Crime analysis training is vital to the growth and success of the field. The training and education analysts are receiving will help define the role of a crime analyst by making supervisors aware of the depth the field has, while also educating them on what it is they are seeking in an analyst. With any luck, the confusion around what makes an effective analyst will soon be a thing of the past and having fairly rigid requirements for the position will be the new standard.

One study has attempted to resolve this lack of clarity in what makes an effective analyst. Evans and Kebbell (2012) conducted research in an attempt to pinpoint what it is that makes an effective analyst. In their research, they found that several authors (McDowell 1998, 2009, Wing 2000, Osborne and Wernicke 2003, Boba 2005, Walsh 2007, MacVean and Harfield 2008, Phillips 2008, Sissens 2008) have generally discussed what effective characteristics for an analyst include. “Previous studies, whilst useful, have the limitation of being anecdotal and lacking robust methodology. For example, the methodologies employed include a review of a generic job description (Peterson 1994), a list of skills generated by one or two experienced analysts (Osborne and Wernicke 2003, Selth 2009) or opinion (Wing 2000, Boba 2005)”. Evans and Kebbell attribute the uncertainty around qualities of an effective analyst to the lack of in-depth research and as a result of this lack of research, general disagreement between authors. To combat this, Evans and Kebbell conducted a study using several different methods to try and determine what makes an effective analyst.

In their results, they found that above all, an effective analyst will have “mastery of the development and dissemination of the analytical product” (Evans and Kebbell, 2012). Among other desired qualities for an analyst are positive attitude, thinking skills, problem solving skills, and a methodical approach. An effective analyst needs to be able to communicate through writing and also

needs to be able to defend their findings when their work comes under scrutiny. Not everyone is interested in all of the technical jargon an analyst could say about a project. Rather, most supervisors just want to hear the hard facts about the analysis and wish to learn what it is they can do to reduce the crime being studied. If an analyst has the ability to communicate with their superiors in this way, they are on the right path towards being an effective analyst.

One final thought to keep in mind in regards to training and personnel. Because the field of crime analysis is as new as it is, many crime analysts are entry level analysts. They have not spent a major amount of time in their positions. Also, departments are slowly beginning to see the need for crime analysis units but are restricted in creating them due to budgetary cutbacks. If this can be overcome, crime analysis units will need leaders. These units will need individuals who know what they are doing and can help guide those under them towards successful and meaningful projects that will greatly assist and benefit the agency as a whole. Obermeyer (1994) supports having a manager who possesses in-depth knowledge of GIS. Obermeyer believes that a department with such a manger will be able to succeed in effectively implementing and utilizing a GIS to its full potential in the future. The knowledge that such a manager possesses could only benefit the department. She states, “A GIS manager’s mastery of the technical aspects of a GIS and spatial (or geographical) analysis is very important

to an organization's eventual effective, efficient, and appropriate use of geographic information". This text gives the reader a much better, more defined answer in what skills and knowledge an ideal crime analyst would possess and it supports the theory that having a manager with experience in the field is very beneficial to a department.

Crime analysis has evolved into an extremely complex field of law enforcement. With the many ways crime analysis can be used, it is vital that an agency know what end result they desire in holding a crime analyst position. As such, hiring a crime analyst is a tricky matter. A great deal of knowledge about crime analysis and much forethought is needed to make an effective hire, but unfortunately, many agencies do not currently possess the appropriate knowledge of crime analysis to make an effective hire. Rather, they post a job opening and essentially hope for the best. Because of this, there is an obvious need for proper training and education in the field of crime analysis. Since the field is as new as it is, there are not many training programs available, though this seems to be rapidly changing. Some law enforcement agencies and even colleges have begun to develop and implement some programs relating to the field but there is still a large need for more programs if the field is to be successful. It is crucial that crime analysis as a discipline gets a solid base before any further expansion. Once a solid base is established, it will only be a matter of time before

the field begins to reach its potential. Crime analysts who were once new to the field will become supervisors and be able to effectively manage a group of subordinates and lead the unit to success. Again, this all comes back to filling the educational and training gap that currently exists. Once this is done, crime analysis can flourish.

Conclusion

Crime analysis as a discipline has had an extensive development period. It began years ago in the 19th century with Sir Robert Peel. From there, it quickly evolved into what it has become today, which is a complex, multifaceted, discipline, requiring significant amounts of knowledge and skill in several areas.

With the evolution of the field as a whole, came the evolution of the technology needed to successfully work in the field. Geographic Information Systems, computers, and other such technology have really formed the backbone of crime analysis as it is today. Without these tools, paper and pin maps would still be in use. GISs have opened up countless new employment opportunities around the nation and have made the creation of different types of crime analysis (criminal investigative analysis, tactical crime analysis, administrative analysis, etc.) possible. They have afforded agencies opportunities to catch suspects in a quicker and sometimes easier fashion. To be able to do all of this well though, crime analysts rely heavily on spatial data. While it may not always be easy for an analyst to acquire needed data, the products crime analysts present are outstanding pieces of work that all started with data collection.

In order for an agency to have such a successful crime analyst or group of analysts, the agency should be familiar with the discipline of crime analysis and

know exactly what it is they are looking for in an applicant. Once an agency has identified skills they desire in an applicant, the hiring process can begin.

It is often debated whether it is better to go through the expense of hiring a crime analyst or if it is better to retain experienced personnel who have learned about local high crime areas over the years and do not need advanced computers to tell them what they already know. This decision ultimately comes down to what goals an agency has and whether or not it is possible to achieve these goals based on their budget and current staffing.

Crime analysis is a very advanced discipline. Despite its lengthy development period, it is still experiencing significant new changes. As such, there is much confusion and uncertainty surrounding the discipline. The purpose of this thesis was to clarify some of the misnomers and uncertainties surrounding what analysts do, how they do it, and who is appropriate for the job. Hopefully these goals have been met and a fuller understanding of crime analysis has been obtained by you, the reader. I encourage you to look further into crime analysis to learn of the benefits it can provide to an agency and also to see what the future holds for the discipline.

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