[Discussion Draft]

Automated Information Systems for Homicide Investigation:

A Survey of Urban Police Departments

By

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1999

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This paper was prepared by the author under contract to the Police Executive Research Forum for the Law Enforcement Technology Series, administered by PERF for the Counterdrug Technology Assessment Center (CTAC) of the Office of National Drug Control Policy (ONDCP). Findings and opinions are those of the author and do not necessarily reflect the policies or official positions of ONDCP.

Contents

I. Introduction

With the growing number of automated investigative support systems in police departments, a tempting assumption would be that those with automated systems are better equipped to face the investigative challenge that certain types of homicides present. Preliminary survey data, however, suggest otherwise. This paper provides a preliminary review of the correlations between departments with and without automated systems and their respective UCR (Uniform Crime Reports) clearance rates. It also summarizes the prominent homicide investigation technology issues throughout the country, with particular emphasis on the role and effectiveness of automated information systems in improving UCR homicide clearance rates.

In an earlier survey, respondents indicated that homicide clearance rates either decreased or remained constant while overall homicides decreased (PERF, 1994). Why some departments' clearance rates decreased and others' remained consistent, even though homicides actually decreased, deserves further exploration. The two main factors this paper examines are the homicide types and the analytical tools used to solve them. By analyzing the correlation, if any, between the clearance rates and detective tools or methods used, we can begin to develop a model that departments can follow to improve their homicide clearance rates.

This study consisted of data collection and aggregation, issue identification via a telephone survey, and report preparation. Previous survey data were reviewed to organize and reduce respondent data into useful data sets for the purpose of a comparative analysis. The scope of the study was limited to all departments that responded to a Police Executive Research Forum (PERF) survey that included 27 metropolitan police departments, four sheriff's departments, and two state police departments. The size and crime rates of departments varied greatly—from as small and low as Boca Raton to as large and high as Washington, DC. To collect the most accurate data, anonymity about department specifics was requested. The survey limited itself to the traditional definition of nonserial homicide investigation information and techniques.

II. Homicide Trends

An increasing body of literature suggests that homicide trends are changing in a way that increases the complexity of investigation and, as a result, affects homicide clearance rates. A Centers for Disease Control study reported that from 1970 to 1979, 48.4 percent of homicides occurred in homes and 23 percent occurred on the street (Madden, 1994). However, from 1986 to 1989, the statistics were reversed: 28.3 percent of homicides occurred in homes, while 50.4 percent occurred on the street. The trend continued in 1990, when 25.4 percent were home homicides and 56.7 percent were street homicides. As discussed in a previous PERF study, this reversal has caused an increase in homicides that are difficult to solve (Richardson, 1994). Street homicide is also known as stranger-to-stranger homicide because the relationships between victims and assailants are more dif-

ficult to establish. Motive, opportunity, and capability are less clear for stranger-to-stranger homicides than for homicides occurring in homes.

Of the departments that reported declines in both overall homicides and homicide clearance rates, an increase in gang activity, drug activity, and stranger-to-stranger homicides was also reported. These reports show that the ratio of street homicides to home homicides is a growing concern and that more robust, tailored investigative tools will be needed to solve this type of crime.

III. Detective Tools

While many respondents indicated that they have some form of automated system for their work as detectives, this study focuses on the systems that are commonly used to support local homicide investigations. These can be grouped into three major types of systems: unit systems, departmental systems, and remote information analysis services (RIAS). The RIAS systems can be further divided into regional and federal systems.

The first and most common type of automated system is the unit system. These are used only by homicide detective units, not by narcotics, gang, or other detective units. Thus they miss certain information that may be useful in homicide investigations. Unit systems have as few as five workstations and are typically on a local area network (LAN), although some are stand-alone. The systems are generally created from commercial off-the-shelf database packages such as dBase III or IV, Paradox, Dataease, Compiled Clipper, and FoxPro. They usually run under DOS 3.3 or later versions; very few are Windows-based, but that may change as the cost of Windows-capable machines decreases.

The second type—departmental systems—are used by several detective units in a single law enforcement department. They are generally shared among homicide, gang, robbery, narcotics, and other specialized units. Departmental systems typically use much more processing power so that they can accommodate 30 to 60 workstations and provide the necessary security levels and speed that resource sharing requires. Later, some issues in the decision to use microcomputers versus minicomputers will be discussed.

The third type of detective tool—RIAS—is actually a service provided by an outside source. That source receives local homicide information via standardized forms that include both check boxes and space for free-text entries. An analyst is assigned to each case and is responsible for reviewing forms for accuracy or obviously conflicting information. Supplied information is proofed and re-entered. The analyst then attempts to match information from the supplied form with information stored in databases, and the matched information is returned to local detectives. Since RIAS organizations serve a multi-state or national area, local investigations benefit from a larger source of information, which is key to solving homicides by mobile gangs or transient suspects. The federal RIAS is called the Violent Criminal Apprehension Program (VICAP). The Washington state area has a regional system known as the Homicide Investigation and

Tracking System (HITS), and Florida has the Violent Crime Information System (Vi-CIS).

Newer versions of regional systems are beginning to emerge, giving detectives and other users local access to databases and analysis applications via Windows-based screens. This direct access offers a quicker turnaround time for data input and query responses than systems that restrict access to designated analysts. System cost is typically in the range of several million dollars, but benefits to user agencies are also reportedly high.

One system currently funded as a High Intensity Drug Trafficking Area (HIDTA) project serves seven counties in Maryland, four counties in Northern Virginia, and Washington, DC. Remote sites are located in 38 participating agencies and four collection sites. This project collects and disseminates drug-related crime information by linking agencies via a PC network with such user-friendly tools as Microsoft Windows. State-of-the-art features including live suspect tracking, geo-mapping, and event conflict detection. Thomas Carr, the project's director, is optimistic about its expansion capabilities.

Another large-scale, integrated system that gives detectives a direct link to local, regional, and federal databases is currently used by the Washington (DC) Metropolitan Police Department. Known as the Washington Area Criminal Intelligence Information System or WACIIS, it has already achieved recognition for its quick implementation and cost-effectiveness. The project progressed from the request-for-proposals (RFP) phase to installation in under than 19 months and cost slightly less than $1 million. Under the direction of Mr. Dillip Kindra, the WACIIS engineering contract was awarded only eight months after the release of the RFP, and formal acceptance testing began one year after the contract award.

Timely progress from RFP through acceptance testing and delivery is critical to achieving system cost and performance objectives. Cost growth as a result of schedule delays makes it hard to keep on budget and to achieve the desired performance. Users' technical environments and functional requirements change constantly. Because schedule delays often force managers to catch up by incorporating new requirements, technical risks and costs are increased.

For WACIIS, successful implementation was most likely the result of a thorough system documentation package that was completed before the RFP was released. Everything from user requirements to hardware feasibility was planned and documented. This is key for timely delivery. A major accomplishment was the inclusion of federally recognized "C2 trusted" security levels, which are the same standards used to ensure protection of classified national security information.

WACIIS gives its users direct access to data. As Mr. Kindra explains, "Every user has a powerful on-line search capability to link and cross-reference names, aliases, businesses, vehicles, addresses, and telephones." The user need not know complicated query languages since the screens prompt for the appropriate information. However, relying on the prompts may limit the fields available to search. The goal of a paperless environment is also being achieved through automated forms processing and through routing and ap-

proval for such items as case reports, statements, search warrants, and management reports.

As these systems become more widely used, another analysis can be performed to judge their effectiveness on clearance rates. User-friendly interfaces and applications are key to the success of these new regional systems.

IV. A Comparison of Trends

A. Trends for Homicides and Homicide Clearance Rates

A comparison of trends for homicides and homicide clearance rates reported by survey respondents is presented in Table 1. Survey respondents generally confirmed earlier studies and the logical expectation that clearance rates tend to decline as homicide rates increase, as long as there is no commensurate increase in detectives or staff assigned to the unit. As expected, the 30 percent of respondents who reported consistent homicide rates also reported that they were able to maintain consistent homicide clearance rates. And in most agencies, increasing homicide rates resulted in a decrease of UCR clearance rates.

A disturbing new trend, as indicated by the shaded boxes in Table 1, is that for many jurisdictions, decreases in homicides were accompanied by decreases in or barely consistent homicide clearance rates. Some departments reported that even though overall homicides declined, detective staffing needed to be increased to help maintain UCR clearance rates.

Table 1
Homicide Rate Trends and Clearance Rates
Shaded areas reflect constant or decreasing clearance rate despite decreasing homicide rate.

	Clearance Rate Trends		
Homicide Rate Trends	Increasing	Constant	Decreasing
Increasing	0	3%	26%
Constant	3%	30%	4%
Decreasing	15%	11%	8%

This finding was confirmed with survey respondents for a period of two years. Some departments indicated a reluctance to go "on the record" with any statistics that could indicate declining homicide clearance rates. Others stated that the statistics just weren't available or that the rates "fluctuated." It is possible that many more departments were non-responsive due to declining or low clearance rates.

B. Homicide and Clearance Rate Trends and Gangs, Drugs, and Homicide Types

In Table 2, note that all the departments with decreasing or constant homicide clearance rates reported increased gang activity, drug activity or other violent crimes, and increased stranger-to-stranger homicides. This group accounted for two-thirds of the total number of respondents.

Table 2
Homicide Rate Trends and Clearance Rates
Shaded areas reflect increased gang, drug, and stranger-to-stranger homicides.

	Clearance Rate Trends		
Homicide Rate Trends	Increasing	Constant	Decreasing
Increasing	0	3%	26%
Constant	3%	30%	4%
Decreasing	15%	11%	8%

Police in Charleston, West Virginia, reporting a low overall crime rate, indicated that they average six to 15 homicides a year in their population of about 60,000. However, violent crime in Charleston nearly doubled when drug activity became noticeable in the city. A swift, concentrated effort to reduce drug activity helped restore the lower crime rate. Unfortunately, not all departments have the resources or administrative policies to respond to the indicators that would forecast an increase in street homicides.

C. Homicide Clearance Rates and Computer Use

Table 3 indicates the relationship between computer users (together and by type of computer system) and homicide clearance rates. Examination of the automated system usage for the various levels of UCR clearance rates, from very high to below the national average, shows a trend among the high-clearance-rate users. The 20 percent of departments that report high clearance rates (80-100%) and use computers reported low stranger-to-stranger homicide rates as well as minimal dependency on computers to solve homicides. The rest of the departments with high clearance rates called particular attention to their non-computerized homicide clearance strategies, which include extensive recurring training for detectives, a teamwork approach within homicide units, regular cooperation with other detective units, and targeted policing programs within the community to reduce gang, drug, and violent crime activity. Such investigative strategies for high-clearance-rate departments have been studied extensively (Richardson, 1994).

Table 3
Homicide Clearance Rates by Computer Users and Type*

Reported Homicide Clearance Rate Groups	% of Computer Users in Group	% of Users Using *Unit Systems* (of computer users in group)	% of Users Using *Department Systems* (of computer users in group)	% of Users Using *RIAS Systems* (of computer users in group)
80%-100%	20%	5%	10%	85%
70%-80%	40%	10%	40%	50%
60%-70%	40%	40%	10%	50%
50%-60%	30%	70%	25%	5%
Below 50%	40%	50%	45%	5%

*** Figures rounded to nearest 5 percent.**

As the use of computer systems increases, homicide clearance rates decrease (this applies to stand-alone systems, not the HITs program). Departments with clearance rates below 60 percent are usually in very large metropolitan areas that witness a high number of stranger-to-stranger homicides. The table also shows that those departments are more dependent on unit computer systems, which are usually dedicated to homicide detective units. As pointed out in a previous study, there are several reasons for the low solvability of homicides in large metropolitan areas (Richardson, 1994). However, manpower and resources are still an issue (LAPD, 1994). As long as resources are a problem, acquiring and maintaining necessary computer systems will be a constant struggle and could even cost more in the long run. These departments need to determine whether the funds and manpower they already have are being applied to the most useful automated systems. This will be discussed in more detail below.

V. Examination of Issues

A. Evidence and Information Issues

As investigators know, evidence is one of the key ingredients for solving homicides. The question is what kind of evidence—and how much—is needed. At one extreme is Great Britain's record-keeping system, which by 1993 was said to contain over 24,000 pieces of information. The British assumed that by cataloging every piece of information, they would be more likely to find matches among other cases that could link or identify suspects (Witzig, 1995). However, such a system requires much manpower and computer equipment. Periodically, as homicide trends shift, the methodology for solving those cases may also have to be reexamined. Since the recent trends in homicide cases reveal movement from the home to the street, traditional investigative techniques and tools must also adapt. Evidence that was successful for solving home or acquaintance homicides may not be as successful for gang-related or other types of street homicides. Where information could once be gathered from immediate family members, relatives, close ac-

quaintances, and the associated "addresses" for them, collection of data related to the newer types of homicide must be altered to capture similarly useful evidence from different sources.

Reading a street scene for evidence or information may also have to be inventive, and computer systems should be designed to accommodate the new type of data. For instance, in Broward County, Florida, the sheriff boasts a homicide clearance rate of 94 percent. As a recent news article indicated, that rate has a lot to do with creative evidence gathering on the part of the detectives. In one case, detectives had two suspects in custody. When they noticed that the suspects' restaurant receipt showed that three, not two, breakfasts had been purchased, the detectives continued their search until they tracked down a third suspect (Sentinel, 1995).

B. Automated Information System Issues

Software systems have attributes, such as development, maintenance, quality, longevity, limits, costs, and usability. By comparing investigative staffs and requirements with the attributes of different types of computer systems, we may understand which users would benefit most from which types of automated systems. This approach, at best, will then suggest the right tool for the job.

1. System Development

It is important for departments to think about their current and long-term needs when developing a software system for homicide investigations. This front-end analysis may prevent software problems in the future. For example, problems often arise when software is expected to expand to meet new goals that were not set when the application was developed. Companies that are faced with obsolete programs and computer hardware usually must start over or migrate to whole new applications to continue their business. Many law enforcement departments are now at this "system migration" or "starting over" phase. Unfortunately, because technology is still developing in this area, migrations and start-overs are to be expected. Survey respondents indicated a number of issues that arise in developing computer systems.

Of the departments that chose to develop their own unit systems, detectives began by automating their existing manual systems to maintain continuity with their own forms and procedures. Survey respondents reported a heavy reliance on in-house developers for small-scale, stand-alone systems. As system scope and complexity increased, development assistance may have been sought from in-house technical specialists or consultants.

Of particular note, survey respondents also reported that the most likely developers of unit computer systems were not professional system developers, but investigative staff. According to survey respondents, the primary reasons for this "do-it-yourself" approach were budgetary constraints and the perceived need to achieve greater control over the project and its maintenance.

Although that approach offers the advantage of involving those who will use the system in the development process, thus increasing the chances that the system will be responsive to unit needs, it also raises a significant time management issue for unit managers. Because system development requires a major investment of professional investigative staff time, it is important that this investment be worth the cost in terms of either caseload reduction or an increased clearance rate. Unfortunately, survey respondents reported that stand-alone or small-scale LAN systems had, at best, a marginal effect on clearance rates. Such systems did provide statistical information that otherwise would not be stored. Nevertheless, the allocation of valuable investigative time or extra staff to system development does not appear to be an optimal use of investigative resources.

Some departments have procured outside assistance from system development companies to create customized systems or to upgrade previously developed law enforcement packages. The resulting systems are generally the second generation of the unit computer systems. They incorporate lessons learned from the first attempt as well as the "best practices" learned by the developer. When negotiating with outside vendors, users should expect the procurement cycle to be long—it's important to examine all requirements for data collection and retrieval by the user. Unfortunately, when stressed by decreasing clearance rates, lengthy procurement cycles are just what departments are trying to avoid.

The large, remote analysis systems are already developed. All agencies need to do is acquire the correct forms and teach personnel how to access these out-of-house systems.

2. System Support

An issue closely related to software development is the availability and quality of system support, such as hardware maintenance, file maintenance, and software debugging. Although survey respondents generally reported good support for large, remote systems, they reported dissatisfaction with the level and quality of support for unit and departmental systems. Poor support was generally attributed to heavy reliance on one or a few of the investigative staff or the inability of system consultants to provide timely and full support. At the unit level, system support depends greatly on the staff member who created the system. Respondents reported a general decline in system performance and utility when the system's developer departed the unit.

A combination of nonexistent or poor system documentation and the use of novel development practices, including unique data structures and dictionaries, makes it extremely difficult for non-technical, investigative professionals to support the system effectively. Unless software vendors or consultants are dedicated to the law enforcement mission and have a keen grasp of operational and technical support requirements, system support requirements are difficult to satisfy.

Remote system support is measured in terms of the length of time needed to analyze cases submitted by local law enforcement officers. A normal case submitted to VICAP could take a few weeks, while HITS is able to provide feedback faster—sometimes in a matter of seconds. However, both systems have same-day service for high priority cases.

Program debugging is also a part of system support. Survey respondents who performed as both developers and users of unit and departmental systems reported software debugging as a major issue. At the unit level, survey respondents reported that software debugging is approached as an informal, reactive process to problems as they are encountered. That means the system is usually in a state of debugging. Once the system creator, who was often the system's most ardent advocate, departs, unit interest in performing complex debugging functions to maintain the system typically wane.

For departmental systems, there is a mix of satisfaction with the vendors' response to bug fixes. Some vendors of law enforcement systems have not provided the level of services expected by some departments. Departments have been known to struggle for a year or more with the installation and debugging of a new system, only to completely abandon the project. Departments that use vendors that can supply both hardware and software seem to have better results and are more pleased with bug fixes.

Respondents who were also users of major, remote systems were unconcerned with software debugging and generally satisfied with system availability and performance.

Turnaround time for system enhancements and upgrades can also affect the quality and value of a system. Long-term enhancement or evolutionary development of small, unit systems is highly unlikely because of the informal developmental strategy employed. Enhancement depends on the availability of the investigator or consultant who developed the application, as well as the developer's specific design, coding, test, and documentation skills. In addition, the rapid innovation in PC hardware and application development tools creates powerful incentives to continually scrap existing systems and build from scratch again. Thus, unit-level systems provide a foundation for lessons learned. Such systems expand slowly, if at all, and usually exist for relatively short periods compared to departmental or remote systems.

At the department level, system enhancement depends on system demand, enhancement cost, and vendor size and capability. Enhancement is easiest when the software is written by professional developers, documentation is of a high quality, and enhancement requirements are well defined.

Although survey respondents reported that enhancement of regional, remote systems was not a major issue for them, most reported having a typical user's interest in influencing the nature, scope, and prioritization of remote-system enhancement plans. Invitations to participate in the specification of functional enhancements are well received and viewed as essential for long-term system success. To date, due to users' requests, automation of required forms for remote submissions is under way and may already be available in some areas. VICAP offers PC-VICAP, which can facilitate and better track form submissions. HITS automatically sends a form to VICAP for each case and may soon develop a PC form interface as well.

Survey respondents reported poor or nonexistent documentation for unit-developed systems. They called that a major reason for the short life cycle of unit-level systems (except where the developer remained on staff). Predictably, system documentation, includ-

ing user guides, data dictionaries, and maintenance manuals, were better for departmental and regional systems, which offered the added benefit of facilitating information sharing.

3. System Users

System users varied by level and scope of system functions. At the unit level, survey respondents reported that the principal users were homicide investigators (detectives). Little to no use of unit-level systems was reported outside investigative units. That's because the systems were originally developed to support a very narrow range of functions with a limited set of data elements.

At the departmental level, system usage included more than one detective unit, with gang, drug, or robbery unit investigators the users most often identified.

The scope of system usage changed dramatically at the remote system level. Because such systems were developed to support a broad range of functions and data requirements, they are used by both detectives and professional criminal analysis staff. Survey respondents also reported that little user training is needed since the forms have been designed to be as simple as possible.

4. Hardware

Findings with respect to hardware were consistent with trends elsewhere in local public agencies. Acquisition, support, and training costs have tended to slow the introduction of new PC technologies and have forced agencies to maintain systems for longer periods than private-sector agencies.

Hardware varied greatly among organizations, with Intel-based PCs in stand-alone or LAN configurations most commonly represented at the unit and departmental levels. At the unit level, PC hardware with the MS-DOS operating system (versions 3.5 to 5.x) tended to be at least two generations behind the market, with 8088, 80286, and 80386 processors representing the spectrum of computing capability. A very minimal amount of the survey's respondents reported using Windows-based applications. This alone would tend to work against success.

At the departmental level, more-powerful PCs and minicomputer systems were the hardware most often used. Those systems, typically produced by DEC/VAX, Data General, and Sun, are much more advanced in processing capability. In addition, respondents reported that most systems at this level were Unix-based to facilitate networking. Another benefit of minicomputers is that the operating systems contain controls that satisfy the security requirements of a multi-user environment. Programmers who attempt to duplicate multi-level security through the application program tend to overburden the application with so much complexity that ease-of-use and problem-free codes are generally not attainable.

5. System Security

The capability and perceived need to maintain information security improves as system scope and investigative units expand. At all levels, survey respondents tended to share the view that information security is a major issue. Concerns about data integrity, proprietary data, and theft were reported at all levels. Predictably, respondents indicated that unit systems did not possess as much security as desired, so manual controls had to be implemented. Most developers found that coding security levels within the system can introduce bugs that render the system difficult and frustrating to use. Because unit systems were designed by and for specific investigative units, maintaining information security within the unit would most likely be assigned to one or two individuals, especially if a LAN was used. Unit-level security typically amounted to nothing more than passwords and control of physical access to the machines.

At the departmental level, information security emerged as a major consideration. Survey respondents reported that the use of Unix or other multi-user operating systems and the employment of a full-time system manager helped reduce information security risks. System managers reported that they play a key role in password administration and in helping to maintain awareness of and adherence to information security policies and procedures. Multi-user operating systems' inherent security features and capability for further security customization make them good choices for departmental systems.

6. System Costs

The dollar cost of self-developed, unit-level information systems is likely to be far higher than is widely understood by survey respondents. Survey respondents reported that unit-level systems cost from zero to $5,000, including hardware, general purpose software, and application development tools. This estimate is at least $5,000 below the average cost estimated by outside vendors and consulting firms, which includes the time required to design, code, test, and document a database of modest size and complexity using a popular development package. The respondents' estimates failed to include the cost of development time (which actually represents lost investigative hours), system administration, and maintenance time.

VI. Conclusion

A preliminary and provocative conclusion of this research is that the unit homicide investigation systems may not only be of limited utility in increasing the homicide clearance rate, but may actually be a factor in increasing investigative workloads and inhibiting the sharing of case data between investigative units. Survey respondents indicated that detective workloads and staff levels increase with the need to maintain such systems, because of data entry, file maintenance, backup, or debugging activities. More interesting, however, is the possibility that "homegrown" automated investigative tools, with unique data dictionaries and protocols for data management, are actually making the exchange of information between investigative units more difficult. If stranger-to-stranger homicides represent an analytically intensive investigative problem, and if that problem, as suggested in National Institute of Justice research, is best approached from a regional or national scope, then the need for consistency in information management among investigative units is paramount (Keppel, 1993). Locally produced analytical tools do not appear to have the capacity to support that requirement and thus may, through the diversion of scarce investigative resources, actually make it more difficult to solve stranger-to-stranger homicides.

VII. Recommendations

Before automatically assuming that a unit or departmental computer system will either increase a department's homicide clearance rates or give individuals time to work on more cases, a law enforcement department should carefully define its expectations for the system and study its intended daily use. It is important to take these steps:

- Examine the type of activity involved in successfully solving the majority of homicides.
- Determine what types of information are most often needed to support an investigation.
- Review who will access the system, how often, and whether users will have any special security needs.
- If an investigator is to develop the anticipated system, determine that person's caseload and availability for a lengthy, full-time commitment.
- If development of a large departmental computer system is desired, be prepared for a lengthy procurement cycle so that vendor credentials can be validated and customized departmental requirements can be developed. Careful attention in the system development phase could help the department avoid costly delays and restarts.

As demonstrated by the remote information analysis services, data integrity cannot be stressed enough. Incorrect data is useless. Data validity checks must be incorporated into the system design. Services like HITS and VICAP also emphasize that a system needs to be able to collect large amounts of data and to expand the areas of collection as needs change. Survey respondents with historical data were able to solve very old homicides because the data was there, it was quickly retrievable, and it remained in a uniform format throughout the years.

Since many departments state that increases in drug activity and violent crime accompany increases in homicide, evidence information can best be exploited when it is shared among detective units and neighboring departments. Departments with separate detective units for narcotics, gangs, and homicide would benefit from information systems that are easy to use and that facilitate data sharing among those units and between departments.

Appendix

Table of Systems and Attributes

Attributes	Unit System	Departmental System	Regional Remote Information Analysis System	Federal Remote Information Analysis System
Developer	Staff officer/detective with some assistance from DP. Could be software house or consultant.	Usually software house or consultant.	Bid cycle; large firm.	Bid cycle; large firm.
Future availability of developer or vendor support	Lasts as long as officer is in unit. Small software house or consultant not reliable. Generally poor.	Generally poor unless vendor is dedicated law enforcement software vendor or in business for a while.	Very good due to large corporate support and programming teams.	Very good due to large corporate support and programming teams.
Probability of bug fixes	Depends on availability of officer, case load, and documentation skills. Small software house or consultant not too responsive as cost-effectiveness of supporting client goes down.	Usually a function of cost of product and size of vendor. If large vendor, support could be good.	Not usually a concern of user.	Not usually a concern of user.
Probability of enhancements or customizations	Depends on availability of officer, case load, and documentation skills. Not likely as project progresses, due to costs.	If package is customized, same as for unit system (left). If not custom, enhancements may be done on vendor's schedule, not department's.	Not usually a concern of user.	Not usually a concern of user.

Attributes	Unit System	Departmental System	Regional Remote Information Analysis System	Federal Remote Information Analysis System
Quality of program delivered	Depends on bug-fixing and programming ability of officer. Software house's or consultant's struggle to identify officer needs usually results in less that adequate programs.	Generally good but development and installation checkout phases are very long and usually overdue.	Usually very good. By the time it goes into production, it works as advertised. Users don't have to worry about this.	Usually very good. By the time it goes into production, it works as advertised. Users don't have to worry about this.
Documentation	Usually poor.	Generally good, but depends on formal training to use system.	Filling out a form is the only requirement.	Filling out a form is the only requirement.
Principal user	Unit detective (in, for example, homicide unit).	A detective. Several related units (such as homicide, narcotics, robbery, gangs).	The analyst who is assigned to your case.	The analyst who is assigned to your case.
Hardware environment	PC-based 8088, 286, 386. DOS 3.3, 5.x. Some use of Windows. LAN with 5 to 30 workstations.	PC-based. Unix based. VMS (VAX, Data General, SUN, etc.).	Large minicomputer systems. VMS or Unix based.	Large minicomputer systems. VMS or Unix based.
Tool set	Commercial, off-the-shelf packages: • dBase III or IV • Dataease • Paradox • COBOL • Compiled Clipper	Commercial, off-the-shelf packages: • dBase III or IV • Paradox • Access • Informix	May be proprietary. All custom code.	May be proprietary All custom code.

	• Access with Windows			

Attributes	Unit System	Departmental System	Regional Remote Information Analysis System	Federal Remote Information Analysis System
Program limits	Small number of tables and fields. "Bad" design; unexpandable. Poor linking due to poor programming design or package limits. Limited by hardware (such as RAM and disk space), especially if files are not compressed. Slow response.	Could be tables as defined by vendor. If the first job of this kind, there could be problems with tables and linking. If more mature, would be better.	No limit to size as yet. Disk space and memory are expandable and "plug-inable."	No limit to size as yet. Disk space and memory are expandable and "plug-inable."
Record limits	Data entry ease and speed limit the number of records in system. Reported: 500 to 2,500.	Same as for unit systems (left).	None known.	None known.
Security risks	High, especially if commercial, off-the-shelf software is used. PC operating system has no user security. Database could be stolen by anyone with access to equipment. Many programs have security, but most seem to be cumbersome and intimidate average detective user.	Generally better if hardware is Unix or multi-tasking operating system and has formal system manager to operate. These have user security built into OS.	Very low. Only analyst at site accesses files.	Very low. Only analyst at site accesses files.

Attributes	Unit System	Departmental System	Regional Remote Information Analysis System	Federal Remote Information Analysis System
Costs	From $0 (except for officer time) to $5,000. Average is several thousand dollars.	Thousands of dollars or more.	Some free to immediate region (HITS is free to Washington users), with nominal fee for others.	Free.
Time needed to use system	Depends on user's skill with keyboard, query language, etc.	Depends on user's skill with keyboard, query language, etc. May require supervisor to access areas not available to detective.	About 30 minutes to fill out form. Analyst on site works problem and returns lead information.	About 30 minutes to fill out form. Analyst on site works problem and returns lead information.

Bibliography

Carr, Tom. High Intensity Drug Trafficking Areas. Interview with author, May 1995.

Gibson, M., and C. Hughes. *Systems Analysis and Design.* Danvers, Massachusetts: Boyd & Fraser, 1994.

Keppel, R., and J. Weis. *Improving the Investigation of Violent Crime: The Homicide Investigation and Tracking System.* Washington: National Institute of Justice, 1993.

Kindra, Dillip. Washington Metropolitan Police Department. Interview with author, May 1995.

Kray, Tom. Booz-Allen & Hamilton, Inc, Law Enforcement and Security Division. Interview with author, May 1995.

Lomarie. Homicide Investigation and Tracking System. Interview with author, May 1995.

Los Angeles Police Department. *Insight from department homicide investigation experts.* Los Angeles: Sidrow, 1994.

Madden, S. *Homicide Evaluation, 1980 to 1989.* Unpublished manuscript. 1990.

Richardson, D. *An Examination of Homicide Clearance Rates: Foundation for the Development of a Homicide Clearance Model.* 1994.

"Third suspect nailed in O'Neill case thanks to superlative detective work," *The Sun Sentinel*, August 26, 1995.

Witzig, Eric. FBI Behavioral Science Unit.. Interview with author, August 1995.