

**ASSESSMENT AND RECOMMENDATIONS
VIOLENT CRIMINAL APPREHENSION PROGRAM**

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VIOLENT CRIMINAL APPREHENSION PROGRAM

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30 October 1992

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U.S. Department of Justice
National Institute of Justice

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EXECUTIVE SUMMARY

During the last three decades, both the number of unsolved homicides and the proportion of all homicides which remain unsolved have increased steadily. An unknown but significant proportion of these unsolved homicides are committed by serial killers. Murderers of this type are difficult to apprehend and the crimes they commit are difficult to solve. When a serial killer commits a series of murders spanning many widely separate jurisdictions, individual law enforcement agencies are not likely to be aware of related murders in other jurisdictions. This limited awareness hampers or even prevents both the investigation and solution of serial murders and the apprehension of serial killers.

The Violent Criminal Apprehension Program (VI-CAP) was created to address the problems posed by multi-jurisdictional serial murderers. However, VI-CAP's workload and responsibilities have steadily grown beyond its resources. This report generally recommends that VI-CAP's policy makers revisit the program's mission, establish priorities, and concentrate resources accordingly. In addition, the report offers the following specific recommendations:

- ① Increase VI-CAP's work space
- ① Increase VI-CAP'S staffing level.
- ① Seek legislation requiring timely reporting of all unsolved homicides.
- ① Establish a National VI-CAP Advisory Council.
- ① Redesign the data collection form.
- ① Replace computer system components.
- ① Provide federal financial assistance to serial homicide investigations and multi-agency investigative task forces.
- ① Develop procedures, programs, and equipment for supporting serial murder investigations and multi-agency investigative task forces.

- ① Develop and promulgate standard procedures and instruments for conducting homicide investigations.

Regardless of which mission priorities are adopted, we believe VI-CAP's policy makers should concentrate on three major tasks:

1. Creating and maintaining a data base of uncleared homicides; uncleared attempted homicides; and uncleared abductions and missing persons where homicide is strongly suspected.
2. Matching crimes within this data base and reporting such matches to involved local jurisdictions.
3. Providing assistance to serial murder and multi-agency investigative task forces investigations.

The system improvements recommended in this report would facilitate accomplishment of these tasks and would allow VI-CAP personnel to concentrate on the areas of greatest need: identifying serial killers and their crimes, assisting state and local jurisdictions with serial homicide cases, coordinating multi-agency investigative task forces, and providing on-site advice from experience serial homicide investigators.

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INTRODUCTION

During the last three decades, both the number of unsolved homicides and the proportion of all homicides which remain unsolved have increased steadily. In 1961, only about 600 homicides remained unsolved less than ten percent of the annual total. As of 1990, there were about 8,000 unsolved homicides, or about one-third of the annual total.

An unknown but significant and perhaps increasing proportion of these unsolved homicides are committed by serial killers who commit a string of three or more murders in separate places and at separate times. Despite their persistent homicides, murderers of this type are difficult to apprehend and the crimes they commit are difficult to solve. This is partly because of the decentralization of law enforcement in the United States.

There are well over 10,000 separate police jurisdictions in the United States. Communication and cooperation among these jurisdictions is haphazard. Thus, when a serial killer commits a series of murders spanning many widely separate jurisdictions, each individual law enforcement agency is likely to be aware only of the murders in its own jurisdiction. By the time an individual agency's murder investigation starts to narrow in on the killer, he may have moved to another jurisdiction and begun murdering again.

As a result, one jurisdiction's murder investigation may stagnate while the target of that investigation is murdering in another jurisdiction. Meanwhile, neither agency is aware that each is seeking the same murderer nor, indeed, that the murderer they are seeking has killed more than once. This limited awareness hampers or even prevents both the investigation and solution of serial murders and the apprehension of serial killers.

This situation could be rectified if all law enforcement jurisdictions shared the details of homicide investigations, but this is difficult if not impossible for several reasons. The first is logistics. Each jurisdiction with an unsolved homicide would need to provide 10,000 other jurisdictions with details of the ongoing investigation. This massive sharing of information would

have to occur 8,000 times each year. Second, special knowledge and skills are needed to determine whether two or more homicides may have been committed by the same person. Many agencies may lack these skills or even the manpower to check whether unsolved homicides in their jurisdiction appear to be related to unsolved homicides in other jurisdictions. Finally, because confidentiality is so important in homicide investigations, law enforcement agencies are extremely reluctant about providing details of on-going investigations to other jurisdictions.

The Violent Criminal Apprehension Program (VI-CAP) was created to solve to these problems. It provides a central clearing-house to which any jurisdiction can send reports of unsolved homicides. At VI-CAP, experienced staff and specially developed computer systems are used to match reported homicides which appear to have been perpetrated by the same offender(s). When matches are found, VI-CAP personnel can inform the involved jurisdictions and assist them in coordinating their investigations.

VI-CAP's design incorporates several concepts which make it specially suited for matching unsolved serial homicides. The first is a standardized questionnaire for describing and reporting unsolved homicides. This questionnaire simplifies the work law enforcement agencies must perform to report and describe a homicide, ensures that the agencies provide all the data relevant to matching homicides, and ensures that the data is provided in a standardized manner designed to simplify the matching process.

Second, VI-CAP's professional and support staff are particularly experienced in investigating serial murders and finding similarities among different items of evidence recovered at suspected serial homicide scenes. This competence is honed over time; assignment to VI-CAP helps these personnel constantly improve their knowledge and skills through continuous involvement with on-going serial homicide investigations. Comparable on-the-job training would be impossible anywhere else. The result is a cadre of experienced professionals available to help or train others in the techniques of serial murder investigation.

A third unique VI-CAP concept is the development of a computer data base of unsolved homicide records and the use of special software to match homicides within this data base. Given

the large number of unsolved homicides in the United States and the numbers of these which may be committed by serial killers, computerized matching is a necessity. However, such matches should always be verified by experienced homicide investigators.

VI-CAP has received a high level of international attention and regard. Law enforcement representatives from around the world have participated in VI-CAP sponsored conferences on serial homicide, homicide matching, and related topics. Law enforcement representatives from Canada and Australia have consulted with the program extensively and are currently implementing systems which are modeled after VI-CAP. In addition, many individual states have developed or are developing systems modeled on VI-CAP, and plan to use these systems to advance progress against violent sexual assaults and robberies as well as homicide.

Despite these successes, VI-CAP has been plagued by a number of resource, organizational, and operational problems. This report will analyze the VI-CAP's operations and offer recommendations for improvement.

PROBLEMS WITH ALTERNATIVE MISSIONS

The Original Mission

VI-CAP was originally intended to collect data on all unsolved and murders and suspected murders in the United States, determine any suspected matches among these crimes, and inform the relevant law enforcement jurisdictions of suspected matches. Its original goal placed a particular emphasis on crimes that involved mutilation of the victims' bodies, missing children with evidence of harm, mysterious disappearances with evidence of foul play, and unidentified homicide victims.

VI-CAP is having difficulty fulfilling this original mission. Of the recorded uncleared homicides which have occurred in the United States since VI-CAP began operating, fewer than twenty percent have been reported to VI-CAP. This understates the problem since many of these homicides were reported to VI-CAP months or even years after the reporting jurisdictions had ceased actively investigating these cases. Timely reporting of unsolved homicides is essential if matching is intended to assist police investigations.

Moreover, VI-CAP has not matched nearly as many homicides as current knowledge about serial killers suggests it might have. This is due, in part, to the low reporting rate of unsolved homicides. Matching unsolved homicides when over eighty percent are unreported is somewhat akin to solving a jigsaw puzzle with many of the pieces missing.

In addition, VI-CAP has been understaffed since its inception. Original plans projected a required staff of fifteen persons, but for its first five years, VI-CAP had a staff of five. More recently staffing has increased but not nearly enough to meet the program's expanding needs.

Further, VI-CAP was originally envisioned as a prototype system. Since it was the first organization of its type, its designers expected that its structure and operation would undergo planned and organized restructuring which would be based upon accruing organizational

experience. With the exception of two major revisions of the VI-CAP questionnaire, such planned organizational changes do not appear to have occurred.

Finally, VI-CAP's current matching procedures are unduly labor intensive and fail to adequately exploit available computer technology. These procedures and the program's effectiveness at achieving its original mission would benefit from major refinements.

Subsequent Missions

Because of its unique nature, VI-CAP has assumed additional missions which no other criminal justice agency is positioned to perform. Frequently, this has occurred as a result of outside requests or even pressure. These additional missions fall into three broad categories:

- ⊙ Providing services to other FBI units, liaisons between these units, and local homicide investigators;
- ⊙ Providing a broad range of matching services to local police agencies; and
- ⊙ Disseminating knowledge about serial murder and multi-agency investigations through the law enforcement community.

VI-CAP provides a variety of services to the FBI. The VI-CAP data base is a valuable research tool for the Behavioral Sciences Unit (BSU). VI-CAP's staff of homicide investigators also forms a valuable link between the FBI and homicide investigators from local jurisdictions. This staff can direct investigators from local agencies to FBI units, including the profiling section of the National Center for the Analysis of Violent Crime (NCAVC) and the FBI's national forensics laboratory, to assist them in their investigations.

In addition to matching homicides which may have been committed by the same serial killer, VI-CAP is currently providing a range of matching services to local jurisdictions. These include matching unidentified bodies to reported disappearances and abductions; constructing time lines to match uncleared homicides, disappearances, and unidentified bodies to apprehended serial killers; and making separate jurisdictions aware of common person(s) committing homicides

and or abduction-homicides across their jurisdictional boundaries. All these matching activities were not part of VI-CAP's originally stated mission, but developed naturally from it.

One extremely important current mission of VI-CAP is to disseminate knowledge of serial murder, serial murder investigations, and multi-agency investigation procedures through the law enforcement community. In fulfilling this mission, VI-CAP has advised jurisdictions on procedures for initiating and carrying through multi-agency investigations, developed and promulgated guidelines for Multi-Agency Investigative Task Forces (MAITs), advised other state and national agencies on the development of VI-CAP like systems, and provided a national and international meeting place and forum for law enforcement officers to trade information and develop new tools and techniques for dealing with serial homicide.

Possible Future Missions

Recently, local law enforcement agencies have become increasingly aware that serial murder and multi-agency task force investigations occur frequently, and that all large police jurisdictions must be prepared to deal with them. However, the resources needed in preparation for such investigations are beyond the budgetary capacities of even most of the larger police jurisdictions. Furthermore, such investigations often require immediate, large infusions of specialized personnel, equipment, and money. Even the largest departments must delay such investigations while they seek out supplementary funds and assemble the necessary resources. Such delays can have a crippling effect.

In response to this acknowledged need, professional law enforcement associations have endorsed the concept of a federal fund to finance serial murder investigations as well as multi-agency task force investigations. If such a fund is established, a federal agency will be required to monitor its operation and disburse resources to eligible local jurisdictions and MAITs. VI-CAP would be the natural choice for several reasons. First, its staff is familiar with the issues involved and understands the exigencies of MAITs and similar investigations. In addition, VI-CAP has already earned the necessary credibility and recognition among local jurisdictions. Finally, VI-

CAP's staff comprises a cadre of persons who could serve as staff in MAITs or train local police officers in MAIT operations.



These varied missions exceed VI-CAP's resource capabilities and undermine its success. If VI-CAP is to achieve a higher level of effectiveness, its policy makers must prioritize its missions and concentrate the program's resources accordingly. VI-CAP must then alter its structure and operations to accommodate this policy direction. Finally, VI-CAP must obtain adequate resources calibrated to the scope of the mission it adopts.

DETERMINING VI-CAP'S TASKS

VI-CAP must determine and prioritize its operational tasks. It is unlikely that VI-CAP could adopt all the tasks listed in this section, but the program should select some for priority handling, arrange for others be assumed by outside agencies, and may legitimately elect to abandon still others.

VI-CAP's most fundamental task is collecting data from all uncleared homicides. Not only is this one of VI-CAP's two original missions but it is also essential to achieving most of the other tasks which are listed in this section. VI-CAP might extend this task to include collecting data on all homicides, abductions and missing person reports where violence is strongly suspected, attempted homicides which suggest the likelihood of an eventual serial crime or escalation, and discoveries of human remains which suggest a crime has been committed. Law enforcement experience suggests that serial homicide investigations frequently involve such incidents. On the other hand, the additional resources needed to process these added cases may be overwhelming and may hinder VI-CAP from fulfilling more crucial tasks.

A second VI-CAP task involves matching evidence from unsolved homicides and informing appropriate jurisdictions of the unit's findings. This is the second of VI-CAP's two original tasks and, without it, collecting data on unsolved homicides has little practical utility. It also provides law enforcement jurisdictions with an incentive to encourage the reporting of unsolved homicides to VI-CAP.

A third VI-CAP task is initiating contacts between local agencies with serial homicides and FBI facilities that may assist them in their investigations. Examples of such FBI facilities include the profiling section of the NCAVC and the FBI's national forensics laboratory. Currently, VI-CAP is informally involved in initiating these contacts although this has never officially been a VI-CAP mission. Like the second task, the achievement of this task would provide additional incentive for the participation of local jurisdictions in the VI-CAP program.

A fourth VI-CAP task involves analyzing national data bases to assist local jurisdictions in their investigations of serial homicides and serial homicide suspects. Currently, VI-CAP uses data from the FBI's National Crime Information Center (NCIC), corrections records, military records, credit card records, and other sources to construct "time-lines" which trace the movements of known and suspected serial offenders. These "time lines" can be used to link known and suspected offenders to other crimes, check offenders' alibis or confessions, and otherwise assist in the investigation and prosecution of serial offenders by local jurisdictions. This has been an increasingly important VI-CAP task, although it was not an explicit part of VI-CAP's original mission. VI-CAP could expand the amount and type of these services which it provides to local jurisdictions. These services provide further incentives for local jurisdictions to cooperate with VI-CAP.

A fifth VI-CAP task is providing direct and indirect assistance to local jurisdictions which are coordinating serial homicide investigations. Although VI-CAP has provided some such assistance in the past, formally adopting this task could involve a considerable increase in VI-CAP's degree of involvement and resource commitment. VI-CAP currently provides direct assistance to local jurisdictions by organizing preliminary meetings of representatives from jurisdictions involved in serial homicides. In addition, VI-CAP has provided indirect assistance by preparing and distributing manuals on initiating, organizing, and managing multi-agency investigation task forces (MAITs) and by organizing conferences on the investigation of serial homicide.

VI-CAP could expand its direct assistance to local jurisdictions by maintaining in-house staff experienced in serial homicide investigations, and by "loaning" the staff to local jurisdictions. VI-CAP could also maintain and "loan" specialized equipment (e.g., encrypted communications gear and special laboratory instruments) needed in serial homicide investigations. It could also supervise and administer a fund to support MAITs (as described above). VI-CAP could expand the indirect assistance it provides by continuing to develop standardized procedures and tools for multi-agency investigative task forces, and by promulgating these through workshops and training

sessions. A broader variation on this task involves promulgating national standards for the investigation of homicides.

A sixth VI-CAP task might be developing VI-CAP systems for use by state and local agencies. Such systems might include plans for organizational structure, templates for required forms, the computer software needed to operate such a system including a data base management system (DBMS) and homicide matching program, and even the computer hardware such a system requires. As a necessary concomitant, VI-CAP would also have to provide training in the use of these VI-CAP systems. To date, VI-CAP has not adopted this task but has sponsored conferences of criminal justice system professionals which have developed design criteria for such VI-CAP systems.

If state and local VI-CAP systems become universal or widespread, a seventh VI-CAP task might be to oversee such systems. There are several reasons for this. The primary reason would be to assure the compatibility of local systems. Without such compatibility, matching homicide information across jurisdictions would be so difficult it would obviate the purpose of these systems. An additional use might be to serve as a central clearinghouse, depository, and matching center for local VI-CAP systems, to distribute local system improvements to other jurisdictions, and perhaps to certify local and state VI-CAP systems for federal aid. Currently, VI-CAP performs no such oversight mission.

An eighth VI-CAP task is to provide a national and international meeting place and forum for law enforcement officers to trade information about and develop new tools and techniques for dealing with serial homicide. Currently, VI-CAP sponsors a number of conferences and work shops in which law enforcement officers and other criminal justice professionals meet to educate one another on homicide, serial homicide, and the investigation of serial homicides. It is likely that VI-CAP's role in this area will expand.

A ninth VI-CAP task might involve the creation of a data base for scientific studies of crime scene profiling and the investigation of serial homicide. Currently, the VI-CAP data base is used by FBI analysts doing scientific studies of homicide, serial murderers, and profiling. With

the appropriate safeguards, the VI-CAP data base might be provided to a larger community of law enforcement professionals and researchers.

These current and potential tasks address two main missions. The first is matching unsolved homicides and informing the involved jurisdictions that they are all probably investigating the crimes of one murderer or team of murderers. This was VI-CAP's original mission, although to date VI-CAP has had less success with this than with the second main mission of coordinating and assisting multi-agency investigations of serial crimes. Even though this was not an explicit part of VI-CAP's original mission, VI-CAP has provided a great deal of direct and indirect help to local jurisdictions which have been involved in serial murder investigations.



All subsequent recommendations in this report are designed to aid VI-CAP in effectively performing either its original mission or its more recently adopted mission of coordinating and assisting multi-agency investigations of serial crimes. The report will designate which recommendations support which mission, and will also discuss situations in which a recommendation may interfere with tasks or missions other than those it is intended to support.

RECOMMENDATIONS

Recommendation 1: Increase VI-CAP's work space

Even current staff levels strain VI-CAP's space allocation to a degree that interferes with work and morale. In addition, current staff levels and equipment are insufficient for performing VI-CAP's primary missions.

There appears to be no available expansion space in VI-CAP's current Quantico, Virginia facility. Therefore, there are four options available for providing VI-CAP with additional space:

- ① Some of VI-CAP's neighboring units at the FBI Academy must relocate to provide additional space for VI-CAP; or
- ① Additional space must be built into VI-CAP's current location; or
- ① VI-CAP must move to another facility; or
- ① A new facility must be built for VI-CAP.

If VI-CAP is to move into another existing facility or a newly built facility there are three options for where this facility should be. VI-CAP can remain at the FBI academy, move to FBI headquarters, or move to another location altogether.

Recommendation 2: Increase VI-CAP staffing levels

To justify this recommendation we will consider only the staff needed to perform VI-CAP's current primary mission of collecting reports on uncleared homicides, matching homicides, and reporting such matches to the appropriate local jurisdictions. We will also assume that VI-CAP retains current procedures. Later in this report, we will recommend changes in VI-CAP's mission and procedures. These recommendations will lead to different personnel requirements

than those we develop here. In all cases, VI-CAP's current staff levels are inadequate to VI-CAP's needs.

Current Staffing

VI-CAP's current staff consists of two Major Case Specialists, two Lead Analysts, five Crime Analysts, one "Rotor", and one Data Entry Clerk. The Major Case Specialists are experienced homicide investigators who provide the insights of their experience when analyzing the VI-CAP database and assist local agencies with serial murder or MAIT investigations. They must be persons with experience in management and homicide investigation.

The Lead Analysts must also be experienced homicide investigators. They supervise the crime analysts, provide the insights of trained homicide investigators when analyzing the VI-CAP database, and assist local agencies with serial murder or MAIT investigations. They also must be persons having experience in management and homicide investigation.

The Crime Analysts perform data editing and telephone data collection for completion of VI-CAP forms, perform a variety of specialized research tasks and special research projects for VI-CAP, and perform computer programming of simple database searches using the language Natural II. They must have skills equivalent to those of a senior research assistant and be capable of developing a knowledge of homicide investigations and VI-CAP operations.

The "Rotor" supervises the filing and logging of VI-CAP report forms. The Data Entry Clerk performs keyboard data entry and secretarial tasks in another function. Both positions require clerical and secretarial skills.

Staffing Needs

If VI-CAP were to begin processing VI-CAP forms for every unsolved homicide, a large staff increase would be required. Currently the critical node in processing VI-CAP forms is the Crime Analysts. Working full-time, they can process about 150 cases per month (simple cases take 1/2 hour, complex ones up to 3 hours). So, in theory, VI-CAP could process about 5,000

cases annually, since about half of each Analyst's time is spent on other crucial tasks. But this theoretical calculation probably overstates VI-CAP's capacity, since VI-CAP is currently processing considerably fewer than 5,000 cases per year, and the Crime Analysts still have backlogs of six to eight months worth of cases, .

To date, VI-CAP annually processes reports that average about twelve percent of the total uncleared homicides. This suggests that VI-CAP might need about eight times its current staff in order to process all uncleared homicides. This projection implies the following staffing levels:

- ⊙ Forty Crime Analysts
- ⊙ Sixteen Major Case Specialists
- ⊙ Sixteen Lead Analysts
- ⊙ Eight Rotors
- ⊙ Eight Data Entry Clerks.

However, scaling considerations and changes in VI-CAP's missions, operations, and equipment could alter these estimates considerably. In particular, major changes in VI-CAP's mission or procedures could considerably reduce the need for certain staff while creating a need for additional types of staff.

For example, Recommendation 3 includes the suggestion that data entry and data quality control should be done at the state level by state agencies. This recommendation suggests that VI-CAP should be primarily concerned with maintaining the VI-CAP database, matching homicides, and assisting local jurisdictions with serial homicide investigations. This can be done using Major Case Specialists and Lead Analysts with the assistance of Crime Analysts. Since Crime Analysts will be relieved of their editing and telephone interviewing duties, there could be a considerable reduction in the ratio of Crime Analysts to Major Case Specialists and Lead Analysts. There would also be less need for clerical support. On the other hand, in Recommendation 6 we strongly recommend that VI-CAP create new positions on its staff for a

systems analyst and a programmer to support computer operations involved with homicide matching.

The above discussion focuses primarily on VI-CAP's mission of matching homicides. If the focus shifts to the alternative mission of supporting MAITs and other types of serial murder investigations, then different considerations enter into an analysis of personnel needs.

Recommendation 3: Seek legislation requiring timely reporting of all unsolved homicides

VI-CAP must increase its coverage of unsolved homicide cases. Since VI-CAP's inception, over 80% of the homicides which should have been reported to VI-CAP have not been, and this proportion of unreported homicides has increased in recent years. Even unsolved homicides which are reported, are frequently reported so late as to have reduced value to VI-CAP's mission. Many jurisdictions have submitted batch filings including many years of unsolved homicides. Apparently, some investigators file VI-CAP forms as a *pro forma* last resort to reassure victim's friends and relations the investigation has not stagnated.

Poor reporting has persisted despite VI-CAP's efforts to publicize the program and the widespread availability of VI-CAP forms to homicide investigators. Interviews with homicide investigators revealed the following most frequently mentioned reasons for not submitting VI-CAP forms:

- ① The form is too long and complex;
- ② It takes too long to complete;
- ③ Other forms such as the Homicide/Missing Person/Unidentified Body Form (HUMP) provide similar services with much less effort or are better known;
- ④ They see no advantage to submitting VI-CAP forms.

In short, a "vicious circle" has developed. Homicide investigators do not submit VI-CAP forms because of their prejudices about VI-CAP. This lack of submissions has complicated VI-

CAP's mission of matching homicides, which in turn lessens the chance that those investigators who do provide forms will benefit from doing so. This reinforces the attitudes that discourage investigators from submitting VI-CAP forms.

To break this "vicious circle," a way must be found of ensuring that most unsolved homicides are reported to VI-CAP. Without legislation, we see only one way in which VI-CAP might increase reporting of unsolved murders. That would be to contact non-reporting agencies, send them a VI-CAP form, and request completion and return of the form.

There are several weaknesses to this approach. First, mandatory completion and return of the forms for all homicides would be very costly. Second, it would still rely on the voluntary, unremunerated cooperation of local jurisdictions. Finally, enforcing such a requirement would substantially depend on VI-CAP's ability to determine when unsolved homicides have occurred. Key-word searches of on-line computer news services may be a good way to identify such cases, however, at best this would provide incomplete coverage.

Federally fund state VI-CAP centers to improving reporting

We believe that the only reliable way for VI-CAP to obtain complete and timely reports of every unsolved homicide is by some type of legislation which encourages or mandates local jurisdictions to report these homicides to VI-CAP. One approach for such legislation would be to federally fund state VI-CAP centers, which in return would be required to collect and forward to VI-CAP reports on all unsolved homicides within the state. Some of the funding required for this measure would be offset, since state processing of VI-CAP data would reduce the amount of processing which the national VI-CAP center would be required to perform. If such a program were established, VI-CAP should administer it, establish uniform procedures and standards, certify states or groups of states for the program, and monitor the performance of agencies participating in the program.

There are several advantages to this approach. First, the states would benefit from additional federal funding for law enforcement. Second, the states have familiarity with other

programs of this type; most notably the Incident Based Reporting System (IBRS) and the National Crime Information Center (NCIC). In addition, many states are already developing such systems, e.g. New York, Iowa, Minnesota, California, and Washington. Third, since state agencies will be responsible for quality control, the national VI-CAP office would benefit from reduced expenditure requirements in that category as well. Fourth, states can flexibly design their systems to be compatible with local conditions and the needs of local jurisdictions. Fifth, many believe that local jurisdictions would be more willing to report to state agencies. Sixth, it would be easier for VI-CAP to standardize and administer 51 (including the District of Columbia) or fewer state operations than to control the quality of thousands of separate reports from tens of thousands of local agencies.

In addition to the above, many state systems have few enough unsolved homicides that they will be able to include in their data bases reports on crimes other than homicides which might relate to VI-CAP crimes (e.g. exceptionally violent rapes and robberies, unsuccessful abductions, and attempted homicides). Collecting reports about these crimes on the national level would overwhelm any system, but this is less likely at the state level. Because of uniform standards, these state level data could be accessed by VI-CAP when appropriate.

There are, of course, disadvantages as well. The timeliness of data submission on the national level might be reduced since reports would be processed by state agencies before being sent to VI-CAP. Also, the forms submitted to VI-CAP may be completed by persons in the state agency who do not have a detailed knowledge of the incident. However, these problems exist in a more severe form in the current VI-CAP program.

It is worth mentioning that this proposed administrative structure is compatible with many different hardware and software systems. Data transfer between state agencies and VI-CAP could occur through telephone or modem up-loading of electronic forms, tape or floppy diskette submission of forms, or the mailing of traditional VI-CAP forms. In fact, different states could use different procedures depending on their technical and financial resources.

Enact a federal statute requiring submission of VI-CAP forms

Enacting a federal statute requiring submission of VI-CAP forms is another alternative. Its effectiveness would depend upon the sanctions and rewards included in the statute. Examples could include withholding NCIC access (or charging increased NCIC access rates) for non-compliance, or making special investigative funds available only to jurisdictions with satisfactory compliance records (see Recommendation 7).

Recommendation 4: Establish a National VI-CAP Advisory Council

A National Advisory Council would benefit VI-CAP in all its missions. The Council should be composed of representatives from regional, state, and local organizations which submit VI-CAP forms. Currently this would mean representatives from states which have Memoranda of Understanding (MOUs) with VI-CAP or intend to draft such an MOU as well as representatives from other jurisdictions and organizations which regularly submit a significant number of VI-CAP forms.

In the future, the Advisory Council might include representatives from all reporting agencies in the VI-CAP system. If this proved too cumbersome then a council with a rotating membership would be another possibility. The Council should contain a core of representatives from the largest reporting agencies and some additional representatives from other agencies. The agencies represented by the latter group would rotate annually so that all smaller agencies would be represented on the Council at least once every few years.

The Advisory Council could be used to cooperatively develop and suggest VI-CAP policy and procedures. It could advise VI-CAP management on system options and alternatives, could provide feedback from VI-CAP users, and could make suggestions on how the needs of participating jurisdictions could best be served.

This panel could be complemented by a "VI-CAP Executive Advisory Panel" composed of significant national policy makers who have a strong interest in the administration of justice. Members in the panel could include senior FBI and Justice Department officials, elected

representatives with seats on the House or Senate Judiciary Committees, and representatives from prominent professional associations (such as the International Association of Chiefs of Police, the Police Foundation, and the National Sheriffs' Institute). The Executive Advisory Panel would provide a source of ongoing support at the policy level by keeping a proper focus on the problem and by assuring that the program continues to receive adequate resource priority.

Recommendation 5: Redesign the data collection form

The current form is much too long and is not always constructed according to established principles of questionnaire design. It also elicits too much information that is clearly extraneous to matching serial crimes while at the same time it omits other information that would aid matching. Finally, many of the questions or the close-ended answers provided are ambiguous, incomplete, or open to misinterpretation. For all of these reasons, the form is difficult and time consuming to complete. Some of these problems would be less serious if only well-trained and experienced officers were completing VI-CAP forms and submitting these forms to VI-CAP headquarters. However, even if this were the case, there is much room for improvement in the VI-CAP questionnaire.

Technical Improvements

There are three immediate steps which VI-CAP should implement to improve the current questionnaire. The first is to consult with experienced questionnaire designers. The second is to alter the current VI-CAP questionnaire to allow for optical scanning and data entry where appropriate. The third is to develop a personal computer version of the questionnaire. An additional step which has been suggested at other times and to which we are opposed is the establishment of a computerized system which would allow local jurisdictions to enter VI-CAP reports via a remote computer telephone link. We will discuss each of these proposed technical improvements in turn.

Government agencies, such as the Census Bureau, have staff with expertise in questionnaire design. After determining what information should be collected via the VI-CAP questionnaire, VI-CAP staff should consult with these experienced questionnaire designers to develop a form that will accurately elicit the information VI-CAP desires. VI-CAP should have the questionnaire designers ensure that:

- ⊙ Questions and answers are properly worded to enhance clarity and ease of understanding and to eliminate ambiguity or incompleteness.
- ⊙ The answers provided for close-ended questions are complete and not over-lapping.
- ⊙ Questions are ordered logically; filter questions and branches are used so that inappropriate questions will be avoided and inconsistent responses cannot occur.
- ⊙ The graphic layout of the questionnaire aides understanding.

Many questions on the VI-CAP form are close-ended or multiple-choice. Recording the answers to such questions could be done by optical scanning equipment if the forms were properly designed and prepared. There are several advantages to such optical scanning. First, it would eliminate a significant amount of clerical labor. Second, it would reduce coding error. Third, optical scanning machinery can be programmed to check for inconsistencies and edit. Optical scanning technology is obviously inappropriate for questions which require written responses. These will still have to be coded and entered by data entry clerks.

A Computerized Questionnaire

The VI-CAP questionnaire could also be improved by developing a computerized version and distributing it to jurisdictions that would prefer using that type of technology. The questionnaire would be in the form of a program that could be distributed on floppy diskettes that would run on IBM personal computers and compatibles. Separate versions could be developed for Apple or other computers if demand were large enough. The program would present the VI-CAP questionnaire to users in the proper sequence and record their answers in a computer file.

The program should include context-sensitive help and definition screens, automatic skipping of inappropriate or irrelevant questions, automatic validation, checking, editing, and computation of answers, and feedback to users about possible entry errors. It should produce encrypted ASCII text files that users would store on floppy diskettes. Users could then mail these diskettes to VI-CAP headquarters where VI-CAP staff would enter them into the VI-CAP database.

Encryption would ensure data security, and automated checking and editing procedures within the questionnaire program would greatly reduce the need for quality control at VI-CAP. VI-CAP might enhance the desirability of this program by having it produce investigation reports that would save homicide investigators additional report writing or record keeping.

The questionnaire program should be a stand-alone system rather a front-end for a proprietary system like DBase, FoxPro, or Paradox. This would ensure that local jurisdictions could use it immediately without expensive investments in additional software. Commercial programs are available for developing such questionnaire programs, or VI-CAP could develop one in-house, or contract to have one written.

There are many advantages to such a program. It would ease the task of completing the VI-CAP form, reduce entry errors, and make the entry of data into the VI-CAP database a straightforward task. Many jurisdictions will have personal computers and staff who are familiar with their use. Those that do not can still use the traditional paper questionnaire.

Remote Modem Entry

VI-CAP could establish a system whereby local jurisdictions could enter information into the VI-CAP data base through a remote computer telephone link. There are compelling arguments against this. First, it would require a stand-alone VI-CAP computer with a whole communications system attached to allow entry from many different locations at once. Further, a complete back-up system would be necessary to ensure 24 hour operation. The system would

require three shifts of operators and systems managers. Finally, there would be complex security problems maintaining the integrity of the VI-CAP data base.

Substantive Improvements

In addition to the proposed technical improvements to the VI-CAP questionnaire, a number of substantive improvements are also possible. The VI-CAP form could be shortened by asking only the minimum data that is required to match serial crimes. Many homicide investigators who are familiar with the current VI-CAP form believe that it contains many questions which are of use in crime profiling research, but of little value in matching serial homicide. Offsetting this might be a need for some additional questions. Some homicide investigators feel the form has too little detail in certain areas that are important in matching homicides. For example, the form might contain questions eliciting detailed ballistics data, fingerprint formulas, dental records, and descriptions of medical artifacts. Future forms should allow for the entry of locations in a manner that computerized mapping programs could use, e.g. satellite generated coordinates. Space might be provided to attach photographs and other such materials. (Although VI-CAP does not currently have the computer technology to incorporate these into its computer data base it might in the future. Also, Crime Analysts who view these materials will remember them to some degree.)

Wherever possible, questions should be multiple-choice or require short written answers. Multiple-choice questions should have an inclusive, non-overlapping set of responses. In the case of some questions this may require that VI-CAP construct an "answer dictionary" and provide it along with the VI-CAP form. Such a dictionary might even provide photographs and color samples to make the answers to some questions, e.g. hair color and body build, less subjective than they currently are. If such a dictionary is complicated enough, VI-CAP might have to provide special training or instruction in its use.

Homicide investigators might be more forthcoming in their responses if there were checkboxes by at least some questions which would allow respondents to indicate whether the

answer could be released for matching purposes to other investigators or should be "held back" in furtherance of the local investigator's attempts to solve the crime. This might help resolve the conflict between the need of investigators to withhold certain facts of a crime and the need of other investigators to know these facts in order to create or confirm crime matches. Such checkboxes would be particularly useful for open-ended questions. These questions are likely to elicit the kinds of details that can lead to matches, but they are also the questions which homicide investigators will be most likely to answer incompletely for fear of compromising their cases.

An open ended narrative should always be part of the VI-CAP form and those completing the form should be strongly encouraged to provide this narrative. Respondents should be prompted to note in this section anything important which they think was inadequately or misleadingly described in other parts of the VI-CAP questionnaire, any special aspects of the crime that struck them as odd or unusual, and any other things which were not covered by the form which they think might aid in matching. VI-CAP software ought to include the capability of matching VI-CAP reports on the basis of keywords in this narrative section.

Further, VI-CAP staff should study these narrative sections for ideas on how to improve other sections of the VI-CAP questionnaire. For example, if subjects not covered in other sections of the form are frequently discussed in this section, VI-CAP should consider adding questions on these subjects to the questionnaire. Also, if investigators are frequently using this section to correct misconceptions created by answers to certain earlier questions, VI-CAP should consider altering these questions to prevent such misconceptions.

Some investigators have suggested that respondents should be asked attach copies of certain portions of the case file to VI-CAP reports. This would allow VI-CAP to ensure that all relevant information was included properly in the VI-CAP form. It would also allow VI-CAP investigators to match cases using information in the case file that could not be included in the VI-CAP form, e.g. photographs, diagrams, and copies of fingerprint lifts. On the other hand, this would impose additional burdens on local jurisdictions, and would prove burdensome to VI-CAP.

Finally, both the VI-CAP form and data base should be flexible enough so that the form and data base could change in response to increased knowledge about serial crimes or changing patterns of serial crimes while still allowing the matching of records from different years. The computer technology for converting records derived from different forms into comparable records within one data base would be relatively straightforward. One way of doing this would be to establish a master database with a master record form. Pointer maps for each different form would allow data to be entered into the master data base. Matching could be done within the master data base.

Recommendation 6: Replace computer system components

We wish to preface this recommendation with the caveat that implementing changes in VI-CAP's computer facilities will be neither easy nor inexpensive. Changes will require careful planning and implementation so the transition between systems will not impede or temporarily halt VI-CAP's operations. It will be necessary to convert VI-CAP's installed data base into the new system. VI-CAP will have to purchase new equipment and software.

The greatest expense will be associated with personnel. VI-CAP must have a dedicated computer technician/programmer/system administrator to continue operating a data base of unsolved homicides and attempting to match homicides in this data base. Even if VI-CAP were to retain the current computer system, there is an acute need for such personnel. It would be impossible for VI-CAP to develop and implement an improved system without such personnel. The following discussion is predicated upon VI-CAP obtaining an appropriation to fund the implementation of the proposed system.

The Current System

The current system is outdated, cumbersome, not well integrated, and inefficient. Currently VI-CAP personnel have TEMPEST rated Burroughs or IBM 386 personal computers

linked to a network with high speed and laser printers. These personal computers can access the FBI's Amdahl mainframe computer through an encrypted microwave link.

Software for the personal computers includes EXCEL, WRITE1, RBASE, FREELANCE, and WORDPERFECT 5.1, although the mix of available software varies from machine to machine. Communication with the FBI mainframe is via FBINET, a menu driven system with security provided by multiple levels of passwords. The VI-CAP database is an ADATABASE system on the FBI's mainframe Amdahl and is accessed by programs written in NATURAL II. The case linking system, AMOS (Automated Modus Operandi Search/matching), is written in PL1.

Before computer analysis begins at VI-CAP, the Crime Analysts assure that VI-CAP forms are complete. The Data Entry Clerk enters them into the FBI's mainframe VI-CAP data base using PC-to-mainframe communication through FBINET. The record documentation required by the FBI's Field Office Information Management System (FOIMS) is automatically produced by a program written in NATURAL II. Daily entries are automatically added to the data base, an AMOS search is done, and form letters of acknowledgment to responding investigators are automatically written.

Daily hard copy output of AMOS is printed at FBI headquarters in Washington DC and delivered by courier to the Crime Analysts at VI-CAP. This hard copy provides information on the ten homicides in the data base which most closely match each homicide submitted the previous day according to the criteria programmed into AMOS. The Analysts then examine the homicides which AMOS has matched to determine if any appear to be related to one another.

Examination by the Crime Analysts is necessary for at least two reasons. First, there are frequently very poor matches between submitted homicides and other homicides in the data base. Thus, even the ten most closely matching homicides may still be poor matches with the submitted homicide. Second, homicide matching is a subtle process, and AMOS is a first attempt to automate the matching process. Therefore, it is necessary to augment AMOS with human intuition. Crime Analysts and Major Crime Specialists also rely on their intuition and memory of

previous cases to do matches. As aids to this, they will write short ad hoc NATURAL programs to search the VI-CAP data base for cases they believe might match newly submitted cases. VI-CAP Crime Analysts and Major Crime Specialists are also responsible for a variety of other tasks involving computer, data bases and other sources of information. An example of this is the construction of "time lines."

Despite their need to write NATURAL programs and perform other programming tasks, Crime Analysts and Major Crime Specialists do not receive training in NATURAL programming or in any other software they need to perform their tasks. This lack of training is compounded by the fact that NATURAL is an early and difficult to use language. VI-CAP staff have become impressively proficient with their software tools despite these handicaps. Further, VI-CAP does not have its own programming staff. Members of the Technical Services Division provide some programming assistance, but this help is limited in nature and insufficient for VI-CAP's needs.

Hardware Improvements

VI-CAP should have an internal networked system of computers with a network server that is fast (at least 50 MH) and has a large data storage capacity (multi Gigabytes). This server could be either a state-of-the-art personal computer or a work station. The size of the VI-CAP data base and the processing power of a computerized matching system do not require a minicomputer or a mainframe computer, but probably do require a central processing unit with more power than most current personal computers have. An NCIC contract with Sun Computer Corporation would allow VI-CAP to purchase Sun workstations, but any processor which could serve as a network server would do. Whichever is used should have large storage capacity, i.e. a storage capacity measured in Gigabytes rather than Megabytes. This storage should use magnetic hard disk technology or newer optical read-write systems. The system should also have at least one nine-track tape drive for magnetic tape I/O. If VI-CAP forms are modified for reading by optical scanning, then an appropriate optical scanning input device should also be part of the system

Individual nodes on this system could be either work stations or personal computers. These nodes should also have large disk capacity measuring in the hundreds of Megabytes. If personal computers are nodes, then software should include Microsoft Windows with a Microsoft Windows X server. An example of such a server is XVision distributed by VisionWare Ltd., Leeds, England. (Government Computer News, 11 May, 1992, page 51) More detailed system hardware requirements would require a more detailed analysis than is possible in this report.

Once such a system is operational VI-CAP should use it for all data entry, data storage, data processing, and programming. Further, VI-CAP should port all previous data bases to this new system. Immediate turn-around of submitted projects would make this system more responsive to VI-CAP's needs than is the current system.

Any necessary backups of the VI-CAP database and uploads and downloads of information between FBI mainframes and VI-CAP could be through a VI-CAP FBI link like the current one. This would allow FBI headquarters access to VI-CAP data for research purposes and monitoring VI-CAP performance.

Software Improvements - Operating System

Each VI-CAP computer should have identical operating system software. Currently there are essentially four possibilities: DOS, DOS with Windows, OS/2, or UNIX. (A fifth personal computer operating system, Windows NT, is under development by Microsoft Corporation but not yet available.) Each operating system has its advantages and disadvantages. DOS and DOS with Windows are similar in this respect. DOS is the most common PC operating system, but Windows is also common and becoming more so. Because of this, there is a large selection of software available for both systems. Also because of their wide use, these systems have developed so as not to require highly trained programmers as system administrators. However, a VI-CAP system based on DOS or Windows would still require a dedicated staff person with special expertise in using computers.

OS/2 is the newest operating system for personal computers. It is, to some extent, a step in the evolution of personal computer operating systems based on DOS and Windows. There is still a considerable amount of doubt whether OS/2 will become widely enough used to have the advantages of DOS or Windows. Early users have reported serious difficulties implementing OS/2. Because it has an uncertain future, we will not discuss OS/2 further.

Although either DOS or Windows would provide an adequate operating system for VI-CAP, UNIX should be seriously considered as an alternative. UNIX is the native operating system for most work stations and there is a large base of software for UNIX systems. Newer UNIX systems can run X-Windows and DOS to support Windows and DOS applications. UNIX is a complicated operating system, but it is relatively easy to generate front ends for such systems (for example by using x-windows) that will be easy for inexperienced operators to use if they are accessing only a limited number of applications.

Programmers who are skilled in and experienced with UNIX operating systems are widely available. There is also a large variety of public domain software available for UNIX. An example is GRASS which might be ideally suited to VI-CAP's purposes. GRASS has a Data Base Management System (DBMS) called RIM which is written in C and has the potential to suit VI-CAP's needs. GRASS is also public domain software with a nationally organized users group which provides support and training.

Minimum Software - DBMS

At minimum, VI-CAP needs a Database Management System (DBMS) and a customized searching and matching system to match and link VI-CAP records. The DBMS should support Local Area Networks (LANs) with concurrent multiple users (up to the number of VI-CAP staff). It should have the capacity to accept data input in a wide variety of formats and to handle text fields of arbitrary length. It should be able to select and download subsets of the database to analysts' computers for further analysis. Finally, it should have the capacity to conduct statistical analysis, matches, searches, linkages, report generation, and other database operations on separate

but linked files. The ability to handle linked files is particularly important since the current VI-CAP database comprises three separate but linked records which are stored in three separate files.

VI-CAP's data base should include features which make it easy for non-programmers to use and program. These features should include the ability to do natural language queries and queries by example. The data base should have a standard form of Structured Query Language (SQL) and be programmable to create user interfaces, frontends, and auto-download procedures. The DBMS should have a native programming language with built in features to allow interfaces with programs written in languages such as C.

Investigators' written accounts of homicides have particular relevance when attempting to match serial crimes. Therefore, VI-CAP's DBMS should have exceptional text searching and matching capabilities. Particularly important will be the ability to match text on sound or similarity rather than exact spelling or phraseology. This will require some kind of sound matching algorithm like "Soundex" and the capacity to do text searches and matches using a "thesaurus" and measures of "semantic distance."

Minimum Software - A New Matching Program To Replace AMOS

VI-CAP needs a new matching and searching program to replace AMOS. The inflexibility of AMOS forces analysts to write NATURAL programs for custom searches. The algorithms it uses are questioned by many homicide investigators and VI-CAP staff. It has successfully matched only a few cases according to the information we have obtained. Further, since AMOS is written in PL/1 it will become more and more difficult to maintain or alter over time.

There are several approaches to replacing AMOS. One would be to redesign AMOS using a modern language like C and more sophisticated statistical analyses and weighting algorithms. A second would be to hire an outside consultant to produce an expert system program. A third approach would involve using the VI-CAP data base to program a neural net system to do automatic linkages. Our preferred approach would be to develop an entirely new search and linkage program.

There are several disadvantages to redesigning AMOS. First, AMOS has not worked very well at matching. In addition, since it is a statistically-based matching system it would require constant updating as new data becomes available. Finally, AMOS is not flexible in responding to analysts' current needs.

An expert system also has disadvantages. It would require several years of expensive development. This development would have to be by an outside contractor who is experienced in the interviewing and programming techniques of expert system development. An expert system is also inflexible. If it had to be updated, the problems of outside contractors and extended development time would recur.

Like a redesigned AMOS or an expert system, neural networks are inflexible and could not do custom searches. Developing a neural network matching system would also require the purchase and programming of special software. The resulting algorithms would be opaque to analysts and hence not subject to either criticism or confirmation.

The preferred solution involves programming a new search and matching program. This new program could be in a current language like C, or it might be possible and preferable to write this program in the VI-CAP DBMS's native programming language. Either of these options would ensure that programmers would be available to maintain and upgrade the system. If the search and matching program were in a common language it would "portable." VI-CAP could provide other agencies with this program when appropriate.

A new search and matching program should incorporate easy user interfaces, a built-in interface with the VI-CAP DBMS, and easy maintainability and portability. The program should incorporate the suggestions homicide investigators have made for an improved matching, searching and linking program. It should provide analysts with the ability to do both searches and matches and to download selected sets of cases to their PCs for further analysis.

Most importantly, the new searching and matching program should give users the flexibility to do any possible type of search and/or match while allowing users defaults to aid standard searches and matches. Users should be able to select a variable and a value, set of

values, or range of values for that variable and have the program select either all matching cases or all non-matching cases in the data base. Users should be able to do the same for logical combinations of variables.

An important option that this searching and matching program should provide is the ability to create "measures of distance" which statisticians refer to as Mahalanobis distance between cases. Users should be able to define a numerical "distance" between different values of a variable for sets of variables. These "distances" can incorporate weights for different variables and/or cases. The program should then be able automatically to calculate "distances" between different cases in the data base. Users should be able to search the data base for all cases within a certain "distance" of each other or all cases within a certain "distance" of one (created) case. The program should have a built-in default "distance measuring" algorithm for situations in which users do not wish to create their own.

Whether users are matching and searching by variable matches or "distance," the program should allow users to specify "cut off points." The user should be able to specify these either in terms of number or percent of cases or in terms of degree of match, e.g. "search for the fifty cases which most closely match the following," or "search for all cases within a 'distance' 3 of the following case". The program should also have a default system resembling AMOS with built-in selected variables, "distance" calculations, and cut-off criteria.

The program should allow users to select a range of variable values when doing a search or match, e.g. height of victim between 61" and 67" or suspect had "light brown"/"blonde"/"light red" hair. It should also allow users to logically combine search and match criteria and to introduce conditional arguments into a search or match request, e.g. "if the victim's race is not Caucasian then weight hair color with a zero in calculating distance between cases."

One conceptually new feature which this program should have is the ability to do searches and matches on items in text fields. The program should allow text field searches on the basis of similar sounding or identically sounding names and/or words. These sound-based searches should be spelling-independent, i.e. based on an algorithm such as Soundex. The program should

incorporate a thesaurus so searches based on one word or concept will include items with related words or concepts. Such a thesaurus might even include Mahalanobis measures of distance in semantic space.

Another conceptually new feature should allow searches and matches based on geographic and temporal patterns. This feature should allow relating location codes in VI-CAP records to computerized maps so that, for example, it would be possible to search for all cases on the data base with crime scenes within twenty miles of a certain stretch of interstate highway between two dates.

Process Improvements

The entry, storage, and processing of the VI-CAP database should occur in-house at VI-CAP. Reporting police agencies should, when possible, submit VI-CAP forms on electronic or magnetic media for automatic loading into the VI-CAP database. Such media might include magnetic tapes, floppy diskettes, or modem downloads. As discussed above, VI-CAP should redesign the current form so that standard answers to most questions can be read by an optical scanner. Wherever possible VI-CAP should process data in electronic form. VI-CAP should also develop programs to automate checking VI-CAP questionnaire responses for completeness and consistency. Such automated checking would reduce the work load of current VI-CAP staff and greatly increase their efficiency.

VI-CAP processes many kinds of data besides data derived from the VI-CAP form. Wherever possible, this data should be processed in electronic form. For example, it should be possible to pre-process the NCIC data which VI-CAP uses in constructing timeliness if this data were provided to VI-CAP in electronic form. This pre-processing could save VI-CAP staff a great deal of effort and time. This suggestion pre-supposes that VI-CAP has a dedicated and skilled programmer who would be capable of writing ad hoc pre-processing programs as needed. However, we believe that VI-CAP currently needs such a dedicated programmer. This need is discussed further below.

VI-CAP should provide much more detailed feedback to corresponding agencies than it currently does. Even if a case is unlikely to match any in the VI-CAP data base, the submitting agency should be given some detailed explanation of why VI-CAP reached this conclusion. VI-CAP must work hard to overcome the impression of many homicide investigators that completing the VI-CAP form has no payback for them.

Staffing

VI-CAP needs at least one dedicated and knowledgeable person to manage and maintain its computer resources. Right now, VI-CAP's work is computer intensive. If some of the technical changes which we envision for VI-CAP occur there will be an even greater need for specialized personnel to maintain and enhance VI-CAP's hardware and software; train VI-CAP personnel in the use of hardware and software; develop ad hoc software; manage the efficient transport of data between VI-CAP's and other computer systems, e.g. the NCIC system; interface VI-CAP with police jurisdictions when necessary; and keep up with new software and hardware developments.

VI-CAP's functions are specialized and unique. An "on loan" computer expert will not understand VI-CAP's needs. Furthermore, ad hoc requirements will arise and such "on loan" experts may not be available when needed. For these reasons, we believe that VI-CAP should have at least two full-time computer personnel.

The junior of these positions should maintain and program the VI-CAP data base. The person holding this position should be an experienced high-level user of the VI-CAP DBMS with the skill to program new routines of any complexity in the DBMS's native programming language. Furthermore, this person should have a detailed knowledge of how the DBMS operates within and relates to the VI-CAP LAN and its operating system. In addition, this person should have specific knowledge and understanding of the VI-CAP system as a whole, including the rationale for VI-CAP; the systems and procedures used to operate and maintain VI-CAP; and

the VI-CAP searching and matching program(s) and how they relate to the VI-CAP operating system, DBMS, and data base.

The duties of the junior computer position would include training and assisting all VI-CAP staff who use the DBMS for searching and matching programs, providing standard maintenance of these programs, and coding small, special purpose programs for VI-CAP staff. This position would report either directly to the VI-CAP Director or to the senior computer specialist (the VI-CAP systems programmer).

The systems programmer position would require a person with all the computer skills of the programmer plus the knowledge and skill to program proficiently in at least one higher level language, e.g. C, PASCAL, ADA, FORTRAN, in addition to knowledge and experience equivalent to at least an MA or MS in computer science. Like the programmer, the person holding this position would be required to understand the rationale and operations of VI-CAP. This person would also have to be familiar with the structure and functioning of all VI-CAP programs and their underlying code. In addition, this position would require the ability to interact effectively with all levels of personnel including outside homicide investigators, VI-CAP analysts, VI-CAP and other technical personnel, and VI-CAP and FBI management. This person would also need to maintain a current knowledge of other areas involved in VI-CAP including: homicide investigation, FBI and VI-CAP operations, geography, computer mapping, geo-coding, and forensic science.

The system programmer's duties would include supervising all VI-CAP computer operations; planning, designing, and implementing enhancements to the VI-CAP computer system; overseeing links with other systems; designing and implementing methods of electronic interchange of data with other systems; and overseeing the management of larger ad hoc programming within the VI-CAP system. This position would report directly to the VI-CAP Director.

Conceivably, these two computer positions could be combined into one if a properly qualified person were found.

Recommendation 7: Provide federal financial assistance to serial homicide investigations and multi-agency investigative task forces

As mentioned earlier, serial murder and multi-agency task force investigations occur frequently, but even the largest law enforcement jurisdictions are unprepared to finance them. In response, professional police associations have endorsed the idea of a federal trust fund for financing serial murder and multi-agency task force investigations. Ideally, VI-CAP would monitor the operation of such a fund and monitor the distribution of its resources to eligible local jurisdictions and MAITs. VI-CAP could be assisted in this by the National Advisory Council discussed in Recommendation 4. This Council could help design such a system and would provide political support for it.

Recommendation 8: Develop procedures, programs, and equipment for supporting serial murder investigations and multi-agency investigative task forces

These procedures and programs could be developed in consultation with the National VI-CAP Advisory Council discussed in Recommendation Four. VI-CAP could facilitate the development of procedures, forms, and software. It could promulgate successful investigative procedures through training sessions at the FBI's National Academy. VI-CAP could maintain the software and equipment, as well as personnel trained in their use. These assets could then be loaned to serial murder investigations and MAITs upon request.

Recommendation 9: Develop and promulgate standard procedures and instruments for conducting homicide investigations

One major difficulty in coordinating the cross-jurisdictional investigations which serial murder investigations require is that every state and local law enforcement agency has its own standards and procedures for conducting homicide investigations. This leads to additional problems when some agencies are less thorough than others in their investigation of these cases. VI-CAP could work to alleviate this situation by developing and promulgating recommended

standards for homicide investigation. This initiative could be strengthened by a certification process for departments which adopt or exceed the VI-CAP standards.

CONCLUSIONS

This report identifies VI-CAP's major current and potential tasks and enumerates a series of recommendations which would enhance VI-CAP's ability to achieve these tasks. VI-CAP management must decide what VI-CAP's mission is and which of these tasks are mission-critical. Once they have made this determination, they can determine which of this report's recommendations are suitable for implementation. This determination will be based on two questions: First, would implementing a recommendation advance VI-CAP's tasks? Second, is a recommendation financially, organizationally, and politically practical? If, for a given recommendation, the answer to either of these questions is no, then VI-CAP should not waste time or effort attempting to implement that particular recommendation.

It is clear that VI-CAP is both under-staffed and yet cramped for space. No matter what other changes are made, after Recommendations One and Two, we believe VI-CAP's policy makers should concentrate on three major tasks:

1. Creating and maintaining a data base of uncleared homicides; uncleared attempted homicides; and uncleared abductions and missing persons where homicide is strongly suspected.
2. Matching crimes within this data base and reporting such matches to involved local jurisdictions.
3. Providing assistance to serial murder and MAIT investigations.

Together, these constitute VI-CAP's original mission. The first two were VI-CAP's original tasks. The third is, we believe, an implicit VI-CAP task and a valid one, since VI-CAP is uniquely positioned and equipped to achieve this task.

To achieve task one, VI-CAP should implement Recommendations Three and Five which recommend legislation requiring or encouraging the reporting of unsolved homicides and redesigning the VI-CAP form. To achieve task two, VI-CAP should implement Recommendation

Six and restructure its computer system. Political support for these efforts could be generated through the National VI-CAP Advisory Council suggested in Recommendation Four. To achieve task three, the most important recommendation to implement is Recommendation Seven to develop a program that would provide federal assistance to serial murder investigations and MAITs.

The most difficult of these to achieve will be legislation mandating the reporting of unsolved homicides. Such a system would be most likely to gain political support if it decentralized data collection by leaving the responsibility for this with the states and provided financial support to the states for their participation. We have described a possible implementation of this system in Recommendation Three.

Implementing Recommendation Three in this manner would have an advantageous impact on the implementation of Recommendations Two and Six. Because states would be responsible for assuring completeness and accuracy of VI-CAP data, funding could depend on VI-CAP monitoring and approval of their systems. A system like this would greatly reduce VI-CAP's need for personnel to do data entry, quality control, and editing. VI-CAP could concentrate its computer operations on analysis which would free funds for hiring the recommended programmer and system analyst. This recommendation would free other VI-CAP personnel to concentrate on tasks which their skills qualify them for: conducting searches and matches in the VI-CAP data base; and assisting local jurisdictions with serial homicide investigations and MAITs by obtaining FBI assistance with profiling, forensic analysis, etc.; doing time-line constructions; and providing on-site advice from experienced serial homicide investigators.