



# National Institute of Justice

P r o g r a m F o c u s

## The Chicago Police Department's Information Collection for Automated Mapping (ICAM) Program



# The Chicago Police Department's Information Collection for Automated Mapping (ICAM) Program

by Thomas F. Rich

To better understand the nature and extent of criminal and social problems in the community and improve allocation of resources, a growing number of crime control and prevention organizations are turning to computerized mapping. A recent National Institute of Justice (NIJ) study reported that officials found

computerized mapping to be a valuable tool that had not yet reached its full potential.<sup>1</sup> Because mapping software has a unique ability to overlay disparate data sets (e.g., citizen complaints; police incident data; the locations of specific sites, such as abandoned buildings or liquor stores;

### Highlights

Computerized mapping is emerging as an effective tool to help police departments track criminal activity in neighborhoods. Combined with a technique known as geocoding (which verifies addresses and links other geographic information with them), computer mapping software can combine data sets to provide a multidimensional view of crime and its potential contributing factors.

Although many large police departments are using this technology, the Chicago Police Department (CPD) has put together one of the most accessible and easy-to-use programs in the Nation. Since its implementation in May 1995, the Information Collection for Automated Mapping (ICAM) program has been praised by the city's police officials, beat officers, and the public.

Because the mapping program was created in conjunction with the Department's community policing program, the maps have been an effective way to work with residents on addressing problems in their neighborhoods. The maps are expected to become regular features of neighborhood beat meetings with police officers.

### User Friendly

ICAM's unique easy-to-use design can be traced to the mandate of the ICAM co-project coordinator, Deputy Superintendent Charles Ramsey, who said the mapping system should be "so user-friendly, even I can make a map." The system designers also factored in the needs of officers. A CPD detective and an officer spent several weeks at a precinct station finding out what officers wanted from the computerized mapping system.

Using a series of clicks made with a computer mouse, ICAM can produce a map of reported offenses of a particular type in a specified area, or it can produce a chart of the 10 most frequently reported offenses in an area. A keyboard is not required for the ICAM system.

The computer hardware and software for ICAM were developed with a \$1 million grant from the Illinois Motor Vehicle Theft Prevention Council. The council understood that computer mapping could permit geographic analysis of the relationship between the locations of a car's theft and its subsequent recovery—thus,

potentially contributing to significant reductions in motor vehicle theft and saving millions of dollars for the insurance industry.

### Planned Enhancements

ICAM currently is not fully accessible to the public because no program exists to block out confidential information, such as the names and addresses of victims. A modified version of ICAM is being developed that will allow the public to generate maps and lists of crimes in their neighborhoods without divulging confidential data.

ICAM is currently limited in its ability to aid crime analysis. For example, an officer cannot generate a map of calls for service or arrests. Major revisions, being made under an initiative known as ICAM 2, will address these and other issues. For example, the enhanced system will be able to map reported offenses within specified distances of a location (e.g., within 1,000 feet of a school) and track changes in crime over time. In addition, a new citywide 911 emergency network will allow officers to access the data bases of districts throughout the city.

and census data), computerized maps can provide a multidimensional overview of crime and its potential contributing factors.

Computerized mapping is particularly useful for police departments with computer-aided dispatch and records management systems, which store and maintain calls for service, as well as incident, arrest, and other data that are potentially mappable. These systems typically have a geocoding feature that verifies addresses and associates them with other geographic information, including police reporting areas, beats, and districts.

Before implementing computerized mapping systems, however, police departments are faced with a number of issues:

- The costs of the necessary hardware and software can be substantial.
- Commercially available mapping software is more complicated and harder to learn than word processing or spreadsheet software and often requires special multiday training courses. This limits the accessibility of the mapping software and often makes police departments dependent on a small number of specially trained persons.
- The data to be mapped must be available on an ongoing basis to ensure that maps are timely and up-to-date. Unless the mapping system can use electronic data that already exist in the department's computer-aided dispatch or records management systems, substantial data entry costs will

be incurred when the data are transferred to the mapping system.

■ Procedures are required to ensure that addresses of data to be mapped are accurate (e.g., street names are spelled correctly). Ideally, an address would be verified whenever it is entered into a computer system. However, it may be necessary, first, to develop an accurate base map; police departments may want to undertake the time-consuming, albeit one-time, task of editing computerized street files of their jurisdictions. The street files can be obtained from the U.S. Bureau of the Census or commercial geographic data vendors, but even

these files may have missing or unnamed streets or incorrect address ranges.

The Chicago Police Department (CPD) has overcome these obstacles and put together a mapping system—Information Collection for Automated Mapping (ICAM)—that can be used by police officers throughout the agency. While a growing number of law enforcement agencies have highly sophisticated mapping systems (see “Mapping Systems in Other Police Departments”), it appears that only CPD has a system that enables officers with little or no special training to create and quickly retrieve

### Mapping Systems in Other Police Departments

Numerous police departments around the country use mapping software, in most cases, to support crime analysis activities. The Dallas and Los Angeles Police Departments are among the more active users of this technology.

**Dallas.** The Dallas Police Department has developed what might be called a “text-only” version of ICAM. Located at each police substation, a “walk-up-and-use” system produces a list of reported offenses that meet specified criteria. Once a list is generated, the user can export it to a general purpose mapping software package (the Department uses MapInfo) that can be used to map the list of offenses. A “handful” of officers in the Department—and at least one civilian at each substation—know how to use MapInfo.<sup>2</sup>

**Los Angeles.** The Los Angeles Police Department contracted with MapInfo

Corporation to develop a custom software application that allows users to generate maps of reported offenses meeting specified criteria. The options for querying the data base of reported offenses are extensive—a user can specify crime types, date and time ranges, *modus operandi*, points of entry/exit, property descriptions, weapon descriptions, suspect descriptions, vehicle descriptions, victim descriptions, and narrative key phrases. The application is installed at all 18 area stations, where it is used by the area crime analyst. The analyst uses the application to produce crime alert bulletins, “in-custody” bulletins, and “wanted” bulletins. The application is also used to enhance cases, to respond to officers’ requests for crime maps, and to generate crime maps for area biweekly tactical planning meetings.<sup>3</sup>

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their own maps of crime and community conditions and share them with the community. This Program Focus discusses ICAM in terms of its development and implementation; current features, usage, and impact; planned enhancements; and implications for other police departments.

### The Context for ICAM: Community Policing

ICAM was developed as part of CPD's far-reaching and ambitious community policing strategy. Unlike many other community policing programs that are limited to a single unit in the department, the Chicago Alternative Policing Strategy (CAPS) is departmentwide. The strategic plan for reinventing CPD describes CAPS as a "wholesale transformation of the department, from a largely centralized, incident-driven, crime suppression agency to a more decentralized, customer-driven organization dedicated to solving problems, preventing crime, and improving the quality of life in each of Chicago's neighborhoods."<sup>4</sup> In fact, CAPS is really a city program with strong support from the Mayor's office and close involvement of city agencies, which have been directed to give top priority to "CAPS service requests" that affect crime and neighborhood safety.

CAPS was launched in April 1993 in 5 prototype police districts; it has since been adopted in all of the city's 25 districts. CAPS revolves around the beat officer, who is assigned for

a minimum of 1 year to a single beat within his or her district.<sup>5</sup> Beat officers are instructed to focus on problem solving, and dispatch procedures have been changed to limit the time they spend responding to calls for service outside their assigned beats.<sup>6</sup> Beat officers are also required to attend regularly scheduled "beat meetings" with community residents.

The evaluation of CAPS, partially funded by NIJ, has focused on the program's implementation in the five prototype districts.<sup>7</sup> The 1995 report stated:

[Many] prototype district residents detected positive changes in policing during its first year of operation, and residents of most of the prototypes thought the police had grown more responsive to community concerns. There was also evidence that the program led to a significant decline in crime-related problems in three prototypes, drug and gang decline in two districts, and significant decreases in levels of physical decay in two areas. Many of the changes in perceptions of crime problems in the prototype areas were mirrored by declines in officially reported crime and survey measures of victimization.<sup>8</sup>

Wesley Skogan, director of the evaluation effort, called the results of CAPS "among the most substantial I've seen" compared to other community policing programs in the country.<sup>9</sup>

### ICAM's Relationship to CAPS

In 1995, officers in all of Chicago's 25 police districts began using ICAM to better understand the problems in their assigned areas and to develop strategies to address them. The officers also began to share ICAM maps with residents, improving police-community relations and giving citizens a chance to help police cut down on crime by providing data for joint police-community problem-solving efforts. Developing ICAM was thus an integral part of Chicago's community policing approach.

**The superintendent's strategic vision for ICAM.** The importance of using and sharing information through technology was a key element in the superintendent's 1993 plan for implementing CAPS:

The Department must continue to seek out and apply new technologies, as it has done in the past with AFIS, Live-Scan, and other systems. New technologies must go beyond finding better ways to detect offenders and respond to crimes: they must provide the information and analytical capabilities that help police officers and the community identify and solve problems and, therefore, prevent crimes.

Information is power. To support our new, decentralized approach to decisionmaking, the Department must establish a new, decentralized approach to data collection and analysis as well. Systems

should be put in place to give officers the information they need, when and where they need it. Where appropriate, these systems should also provide community members with up-to-date statistical information to help them in identifying and targeting problems.<sup>10</sup>

The superintendent also emphasized the importance of accessibility as a feature of any new information system: "In many cases, computers will need to be moved out of the back room, where they have served as specialized tools, and into the operational levels of our organization, where they can become more flexible and far-reaching tools of the police."<sup>11</sup>

## Development of ICAM

Using the superintendent's strategic vision as a guide, Officer Jonathan Lewin (24th District) and Detective Larry Soltysiak (Area 4 Division) took on the challenge of developing a system that would provide useful information directly to the beat officer. At the time, beat officers relied on handwritten offense reports to determine the level of criminal activity in their assignment areas, which took days to analyze in any detail. Computerized incident data were kept on CPD's mainframe, but the system was accessible only to trained computer operators.

**CPD's prior experience with mapping.** Developing ICAM was not CPD's first attempt to implement computerized mapping. Two earlier

collaborations between researchers and CPD had demonstrated both the feasibility and utility of such an approach. The first effort in 1988, an NIJ-funded project, involved CPD, the Chicago Alliance for Neighborhood Safety (CANS)—an umbrella organization that trains community residents in problem solving—and researchers at the University of Illinois at Chicago and Northwestern University in creating a rudimentary map-based crime analysis system in one CPD district. In their report, the researchers stated that the system had an impact in a number of areas, including:

[In] combining data from different sources, in providing an institutional memory of a beat, in providing detectives with the ability to search for patterns more readily, in permitting proactive management by the district commander, and in improving community relations between the police and community organizations.<sup>12</sup>

Warren Friedman, executive director of CANS, believes that initiation of the ICAM project was a particularly significant step toward obtaining CPD acknowledgment of the importance of working with community organizations.<sup>13</sup>

Later, in 1991, researchers at the Illinois Criminal Justice Information Authority and police officials in CPD's Area 4 teamed up to implement a map-based system for studying street gang crime.<sup>14</sup> The study helped identify those areas with the highest risk of gang-related violence. This effort was notable because it combined police data with a wide variety of community

data, including the location of rapid-transit stops, schools, youth organizations, public housing facilities, parks, liquor stores, and demographic data.<sup>15</sup> These maps could depict not only "hot spots" and other locations where crimes were committed but also an array of associated and possibly contributing factors.

To build on these previous efforts, in 1993 Officer Lewin and Detective Soltysiak first spent several weeks in the 11th District (Area 4) interviewing beat officers and detectives and testing various formats to determine the presentation and type of information that would be most useful to officers and detectives. The consensus was that maps—"simple, clear, and easy-to-read"—would be the most useful format to display crime information.

**Obtaining funding.** However, one obstacle to developing the computerized mapping system was cost. For a comprehensive system to be put in place, money was needed to pay for the hardware and software at all 25 police districts and specialized CPD units at the area level, which included a work station for running ICAM, a server for network maintenance and support, and a laser printer.

CPD applied for and received a \$1 million award from the Illinois Motor Vehicle Theft Prevention Council (IMVTPC) to buy the necessary equipment. IMVTPC, created in 1991 by the insurance industry, envisioned computerized mapping as an effective tool for auto theft investigators because it would allow a geographic analysis of the relationship between the location of a car theft and the

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location of the car's recovery. IMVTPC supports a variety of vehicle theft prevention programs; for example, they provided funds for mobile data terminals for CPD patrol cars in 1992, which enabled patrol officers to query State and national stolen vehicle files.

If computerized mapping could reduce the number of auto thefts in Chicago—where two-thirds of the State's auto thefts occur—IMVTPC believed it could save the insurance industry millions of dollars each year. IMVTPC made the award even with the understanding that the mapping system would cover all crimes, not just those related to automobiles.<sup>16</sup>

### **From prototype to implementation.**

With funding secured, Lewin and Soltysiak, then joined by Gene Chin, a senior systems analyst in CPD's Data Systems Division, began developing the mapping system. But after attending a workshop on using computerized mapping for crime analysis at the Illinois Criminal Justice Information Authority in August 1993, the team realized that although many police departments had sophisticated crime mapping systems, no department had a system that was accessible to beat officers.<sup>17</sup> Thus, the team had to create a unique prototype. In late summer 1993, the development team set up its first model in CPD's 24th District. The results were disappointing. Beat officers found the system too complicated to use, and the 10 to 15 minutes required to generate a map was considered unacceptable.

Then in summer 1994 CPD Deputy Superintendent and CAPS Co-Project Director (then Deputy Chief) Charles Ramsey made an unannounced visit to the 24th District. Ramsey issued a challenge to the development team: Implement a system "that is so user-friendly even I can make a map."<sup>18</sup> The team focused its efforts on developing a system that, in terms of ease of use, more closely resembles an automated teller machine (ATM) than standard office automation software. In addition to changing ICAM's hardware and software platforms,<sup>19</sup> the team decided that ICAM would not require use of a keyboard (in fact, ICAM PC's do not even have keyboards). Instead, all user selections and commands would be issued with a mouse.

In October 1994, an ICAM prototype was set up in the 24th District. By May 1995, ICAM was installed in all 25 districts.

### **ICAM Features**

When the ICAM computer is turned on, the main screen automatically appears (see "ICAM's Query Screens"). The two main tasks that ICAM performs are indicated in the boxes containing the "Do It!" buttons: ICAM can produce a map of reported offenses of a particular type in an area, or it can generate a list of the 10 most frequently reported offenses in a beat.

ICAM allows a user to generate a map in as few as *three* mouse clicks. A simple query can be modified in a

number of ways, each of which requires a few additional mouse clicks. As shown in exhibit 1, page 8, the user can change the default query parameters by specifying one or more secondary classifications of the primary offense, changing the desired geographic area, changing the date and time range, or specifying a particular type of location.

The ability to map offenses meeting these criteria is a standard feature of any map-based crime analysis system. What is unique about ICAM is the way in which the user formulates the query. By default, ICAM maps offenses occurring in the past 10 days. However, any date and time range can be selected (e.g., the past 2 days or midnight to 8 a.m. during the past month). The simplicity of the method for selecting a date and time range illustrates the efforts made by the ICAM development team to ensure ICAM's accessibility to officers. Since keyboards are not attached to ICAM PC's, the traditional way of specifying a date and time range—typing in the starting and ending dates and times—could not be used. Instead, a calendar screen is displayed (see "ICAM's Query Screens"), and the user simply clicks on the desired month, day, and year for both the start and end dates. There is a similar screen for selecting the time range.

After the user clicks "Do It!," ICAM runs the query against the offense data file and displays on the screen both a map and a tabular view of the offenses meeting the specified criteria

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(see "ICAM's Information Screens"). The map displays the specified geographic area (e.g., district, sector, or beat), the streets in this geographic area, the names of major streets, and icons showing the location of each offense meeting the specified criteria. If secondary offenses have been requested, each type will have a different

icon, with all the different icons being shown in a map legend window.

At this point, the user has several options (see exhibit 2, page 10), including printing the map or tabular view of the data, displaying community data, performing other geographic analyses, or returning to the ICAM Main Screen

and formulating another query. A list of the ten most frequently reported offenses in a beat in the past 10 days—the "Top Ten" feature of ICAM—can be obtained with just *three* mouse clicks. The default time period of 10 days can be changed by accessing the date and time selection screens.

## ICAM's Query Screens

From the ICAM Main Screen, the user can select the default setting to map the locations of all reported robberies occurring in the past 10 days in a district; the user simply has to:

1. Click on the primary offense scroll button to display the list of primary offenses.
2. From the list of primary offenses, click on "robbery."
3. Click on the button labeled "Do It!"

The user could choose to pose a different query to obtain a list of the most frequently reported offenses in a beat; in this instance, the user would:

1. Click on the "pick beat" scroll button to display the list of beats in the district.
2. From the list of beats, click on the desired beat.
3. Click on the button labeled "Do It!"

If the user wants to specify a different time and date range from the 10-day default period for the query, he or she moves to the following calendar screen and clicks on the time period desired.

Information Collection for Automated Mapping

TO MAKE MAP:  
Robbery

DO IT!

Secondary Offense  
Beat  
Date/ Time  
Location

CURRENT SELECTION

TOP TEN  
Pick Beat

DO IT!

Block Search  
RESET ALL

Alerts  
Msg from Supt.  
Support Personnel  
Review Officer

Release 1.2/27Feb95  
CURRENT SETTINGS:  
PRIMARY OFF: Robbery  
START DATE: 8/20/95  
STOP DATE: 8/30/95  
START TIME: 0000  
STOP TIME: 2359  
BEAT: 2100  
LOCATION CODE: ALL  
LAST DATA UPD: Feature Pending

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Jan	Feb	Mar	Apr	May	June		
July	Aug	Sept	Oct	Nov	Dec		
F	1	2	3	4	5	6	7
R	8	9	10	11	12	13	14
O	15	16	17	18	19	20	21
M	22	23	24	25	26	27	28
	29	30	31				
1994	1995	1996	1997	1998			

RESET ALL

8 30 95

Jan	Feb	Mar	Apr	May	June		
July	Aug	Sept	Oct	Nov	Dec		
T	1	2	3	4	5	6	7
O	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31				
1994	1995	1996	1997	1998			

DONE

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**Exhibit 1**  
**ICAM's Mapping Features: Query Components**

Component	Options
Primary Offense	Only one primary offense can be selected per map.
Secondary Offense	For the selected primary offense, up to 10 secondary classifications can be selected. For example, if robbery is the primary offense and the secondary offenses are "with a knife" and "with a gun," then only robberies with a knife or a gun are mapped.
Geographic Area	The choices are the entire district, one sector, or one beat. The default selection is the entire district.
Date Range	Both a start and end date are selected. The default selection is the past 10 days.
Time of Day Range	Both a start and end time are selected. For example, if the user is only interested in offenses occurring during the day shift, 800 to 1600 would be selected. The default selection is all day.
Type of Location	The type of location includes those categories listed on the CPD General Offense case report—examples include on a bus, in an apartment, at a business, and at a church. If "in an apartment" is selected, then only offenses occurring in apartments would be mapped. The default selection is all types of locations.

## ICAM Implementation and Training

An official unveiling ceremony accompanied installation of ICAM at each of the city's 25 districts as the development team introduced the system to district police officials and residents during the period from October 1994 to May 1995. Although ICAM was designed for easy accessibility, training in its use was still needed by police officers at the district stations. The ICAM development team produced an 8-minute instructional video to be played during roll call at all district stations. Detective Soltysiak also spent 2 days at each district station demonstrating ICAM to officers and training district administrative managers, who would then serve

as contact persons to provide assistance to district personnel. Thus, the development team adopted a "train the trainers" approach to ICAM instruction.

The development team also wrote an ICAM users' guide and prepared a one-page "Quick Map" instruction sheet, which was posted next to the ICAM PC's in each district station. The ICAM PC's were placed in a common area (e.g., behind the district desk), rather than being locked in an office, to make them accessible to police personnel around the clock.

**Quality of data.** The availability of timely and accurate data is key to ICAM's effective use. One of the potential obstacles that police departments face in implementing computerized mapping systems is the added

cost of entering the data. Fortunately, ICAM was able to "piggyback" onto existing data-entry procedures in the districts to minimize costs. Data-entry procedures are standardized. At 6 a.m. in each district, offense reports written during the previous 24 hours are entered in a PC-based data base package—a practice instituted long before ICAM for the purpose of producing district "24-hour" reports. To enhance the data consistency, the user selects values from predefined lists rather than simply typing in values. For example, if the offense is a burglary, the user selects "burglary" from the list of offenses rather than typing in the word "burglary." Once these data are entered, the data-entry clerk follows a three-step procedure: (1) executing a "geocode" routine on the data, during which the latitude and longitude of the location of each offense are computed; (2) executing a "copy" routine that extracts the offense data and writes it to a diskette; and (3) executing a "load" routine that copies the new offense data from the diskette to ICAM. These procedures ensure that ICAM data are, at most, 24 hours old.

The importance of the geocode step in this process should be emphasized. As noted earlier, some addresses stored in police files may be initially unmappable because the underlying street maps are incomplete or inaccurate. A team of researchers from Loyola University in Chicago encountered this problem in 1991 when they attempted to map the location of homicides in Chicago using the U.S. Bureau of the Census computerized street files (i.e., TIGER files). The researchers found missing

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## ICAM's Information Screens

A query on criminal damage to vehicles would result in a map and tabular data.

streets near the boundary of the city, unnamed and misnamed streets, and incorrect or missing address ranges. They corrected these problems and added important landmarks to the TIGER files.<sup>20</sup>

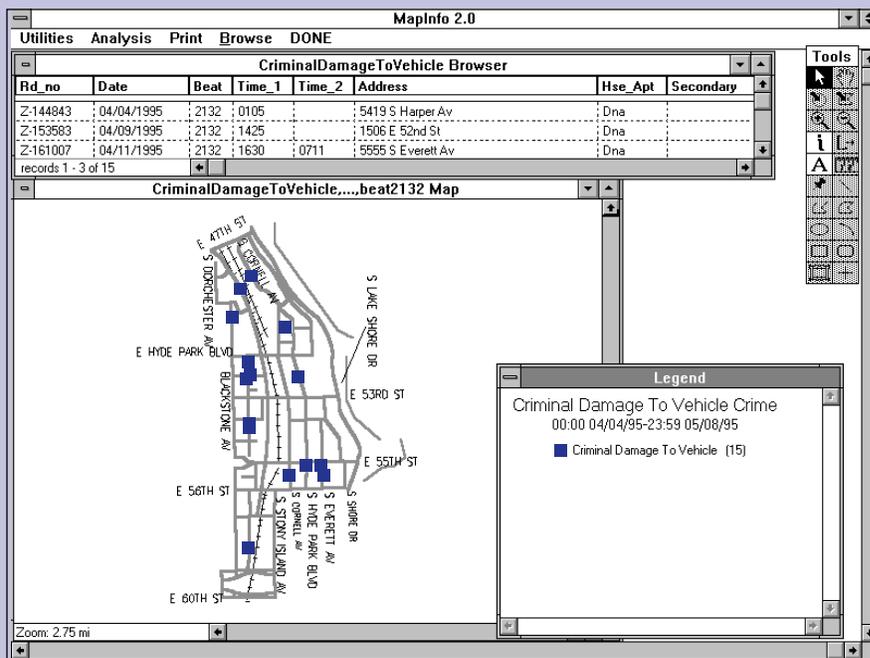
The researchers provided these improved files to the ICAM development team, who refined them even further. About 95 percent of the offenses entered at the district stations are geocoded automatically by the computer.<sup>21</sup>

### Use and Impact of ICAM

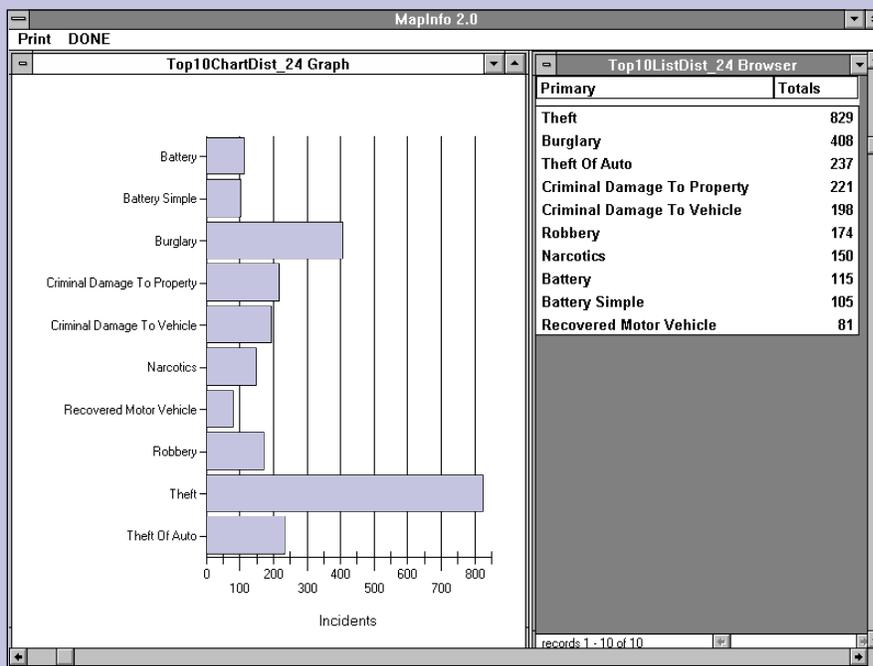
ICAM has fulfilled two of the key requirements for successfully implementing CAPS; it has provided:

- Police officers with an automated tool for analyzing timely and accurate crime information.
- An effective and convenient mechanism for sharing information with the community.

**Support for ICAM.** As a result, ICAM has earned enthusiastic support from high-ranking city and CPD officials. Mayor Daley, who attended 10 of the 25 district unveiling ceremonies for ICAM, has said, "ICAM is the best thing to come from the police department in years."<sup>22</sup> CPD Superintendent Matt Rodriguez has pointed to ICAM as the epitome of decentralized decisionmaking: "[ICAM] goes a long way to making the officer the chief of police of his beat."<sup>23</sup> CAPS Co-Project Directors Barbara McDonald and Charles Ramsey have seen ICAM



A query on the top ten offenses in one beat does not generate a map but, instead, produces a simple list and graph.



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**Exhibit 2**  
**ICAM Mapping Features: Options Once the Query is Run**

Option	Comment
Panning and Zooming	The section of the map shown on the screen can be moved in any direction (panning), or the distance across the displayed section of the map can be changed (zooming).
View Details of Offenses	A tabular view of the data is produced (see “ICAM’s Information Screens”). The data elements include: address, house or apartment number, case report number, crime code, primary offense classification, secondary offense classification, whether the offense is a Part 1 index crime, date, beat, start and end times, location code, type of location, number arrested, four analysis fields used to flag special offenses (e.g., domestic violence, gang-related offenses), offender description or name, vehicle make, vehicle model, vehicle year, and the beat in which the vehicle was taken.
Print Map	The map can be printed. A disclaimer is shown at the bottom of the printout indicating that the classification of the offense is based only on the facts known at the time the offense was reported (see exhibit 3). Printed maps can be shared with the community.
Print Tabular View of Data	The tabular view of the data can be printed. However, because the offense information available in ICAM is unverified, printed tabular views of the data are not shared with the community.
Add Vacant Buildings to the Map	The locations of vacant buildings can be added to the map.
Add Schools to the Map	The locations of schools can be added to the map.
Add Establishments with Liquor Licenses to the Map	The locations of establishments with liquor licenses can be added to the map.
Add “EL” Stops to the Map	The locations of Chicago Transit Authority elevated (EL) railway stops can be added to the map.
Radius Select	A list of all offenses within a specified distance from a specified location on the map can be generated (e.g., all offenses within 1,000 feet of a school) and displayed in a table.
Area Select	A list of all offenses within a specified beat within the sector or district can be generated and displayed in a table.

as critical to the success of CAPS. ICAM, Ramsey said, has been “a linchpin of the whole strategy.”<sup>24</sup>

Of equal importance has been the reaction at the district stations. Although no formal survey of officers has been taken, in general, they have praised the simplicity of the system and said it helps them in performing their jobs.

**Data on ICAM usage.** The actual number of CPD officers who are using ICAM is not known. The development team estimated that 20 percent of all officers use ICAM regularly, 60 percent use ICAM occasionally, and 20

percent use it rarely, if ever. One measure of ICAM use—the number of queries run at each district (a query results in either a map or a “Top Ten” list)—can be tracked. From June 26, 1995, to July 25, 1995, a total of 6,689 queries were run citywide—an average of 223 queries per day citywide, or 9 queries per day in each district. Even more revealing is the increasing use of the system over time. The number of queries in the period’s fourth week was 34 percent higher than in the first week.

**Crime analysis.** In general, the most common use of computerized mapping

in police departments is for crime analysis. Crime analysts use mapping software to prepare crime alert bulletins and other reports. Because of ICAM’s simplicity, all CPD officers have access to analytic tools that are unavailable to police officers in other departments. No determinations can be made of the number of crimes ICAM has helped to resolve, but anecdotes of ICAM’s effectiveness as a crime-solving tool for CPD are plentiful (see “ICAM in Action”).

ICAM also helps beat officers to make decisions about their work plans. Officer Valeria Mac, a beat officer in the

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24th District, said she regularly uses ICAM as an aid in deciding where to concentrate her foot patrol activities. When Mac returns to her beat after a few days off, she prints out ICAM maps so she can see where crimes were committed.

**Beat meetings.** Since the success of CAPS depends on police-community partnerships, beat meetings are a primary mechanism for soliciting community involvement. These meetings, which occur regularly in each of CPD's 279 beats, are intended to be "the forums in which officers and residents jointly develop plans for tackling neighborhood problems."<sup>25</sup>

The cornerstone to developing strategies that address neighborhood problems is the availability of timely and accurate information on their nature and extent. ICAM is helping to fulfill this information need as officers routinely bring maps to meetings and distribute them to residents (see exhibit 3). However, the tabular view of the data, available to officers using ICAM, is not made public because it is not fully verified (i.e., ICAM contains information recorded on the initial offense report that has not yet been validated by detectives or other followup investigators). In addition, exact street addresses of the offenses are excluded to prevent identification of victims. However, the maps allow residents to see the approximate locations where offenses occurred and provide an overall understanding of crime in the area.

One neighborhood relations officer in the 24th District, Athena Mullen, who

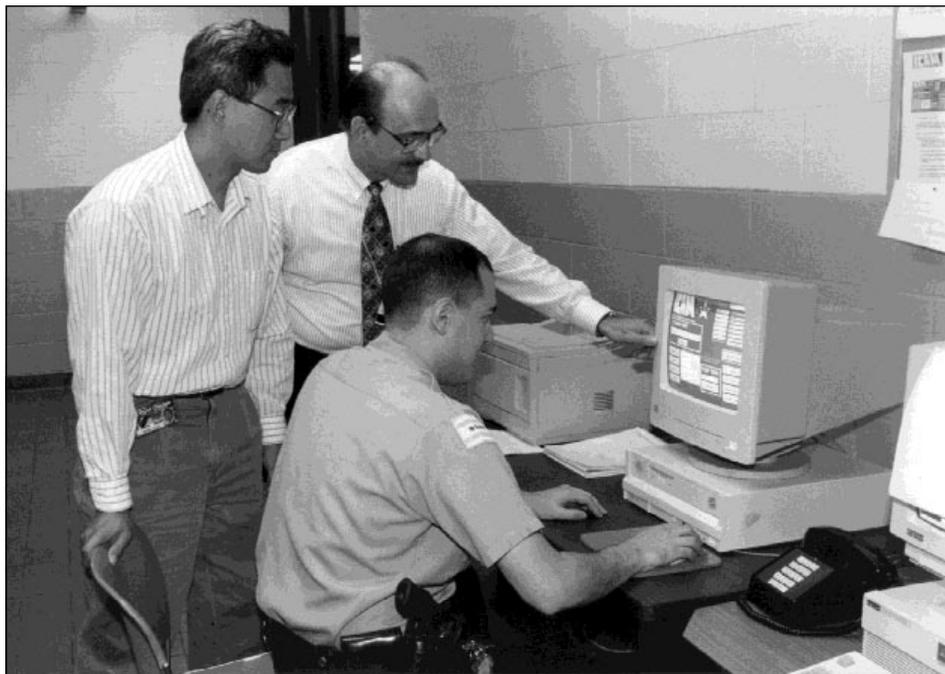


Photo by Jonathan Cohon

Members of the ICAM development team check out the program.

routinely distributes ICAM maps at beat meetings, has noted, "everybody likes the maps." In one beat, community residents had already been producing hand-drawn maps, so they were especially appreciative of ICAM. In many beats, community residents call Officer Mullen prior to the meetings and request that she bring certain maps, particularly those depicting offenses that residents find most problematic.

In many districts, ICAM is relatively new, so the impact of ICAM-produced maps among residents is still unknown. Also unknown is the extent to which residents are using ICAM to develop new strategies for improving their neighborhoods. A recent CANS publication encouraged residents attending beat meetings to take advantage of the maps to prioritize neighborhood problems, develop and plan a strategy for addressing problems, and, later, use ICAM to assess

whether the problems are recurring.<sup>26</sup> Warren Friedman, of CANS, a long-time advocate of police-community partnerships, is pleased that CPD now routinely shares information with the community. ICAM "helps to facilitate discussions with the police department," Friedman says. But he cautions that it is too early to tell if the technique will help residents develop more effective and appropriate strategies to combat neighborhood problems.<sup>27</sup>

**Court Advocacy project.** ICAM is important to another component of community involvement in CAPS—the Court Advocacy project. Court Advocacy units exist in every police district. Their purpose is to "identify crime problems within their police districts—especially those...which negatively impact upon quality of life—and to follow those cases in court in order to actively participate in and have an effect on the criminal justice process. The intended out-

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## ICAM in Action

Anecdotes of how ICAM has been used to help solve crimes include the following:

■ In March 1995, three officers in the 10th District caught three teenagers in the act of burglarizing a home.<sup>28</sup> The surrounding area recently had experienced a rash of burglaries, and the officers suspected that the teenagers were responsible for many of them. The teenagers confessed to committing several of the burglaries, but they could not remember the addresses of the homes. Back at the district station, the officers used ICAM to generate a map and a list of all burglaries occurring in the past 6 months in the general vicinity of where the teenagers were operating. With the map and list as a guide, the officers then drove the teenagers to specific homes to determine which ones they had burglarized. With just a few hours' work, 11 burglaries were cleared,

and residents were able to recover their stolen property, which had been stored in the home of one teenager.

■ In the 22nd District, officers learned of a rash of burglaries occurring at schools and used ICAM to map the exact locations of these burglaries and determine patterns about the times they were occurring. Officers then established surveillance at the appropriate times and locations and soon arrested a burglar as he was fleeing a school.

■ In the 3rd District, residents at a beat meeting complained about an increase in criminal activity. Using ICAM, officers spotted an area in the beat that had experienced an increase in burglaries and robberies. Tactical officers set up surveillance and arrested three offenders for armed robbery.

■ Tactical officers in the 24th District received a complaint from residents that drugs were being sold at a particular street corner. Using ICAM to check crime conditions at that corner, the officers found there had been numerous prostitution arrests, but no drug activity. Further checking revealed that one particular female—who matched the description provided by residents—had been arrested several times at this corner. In this case, ICAM revealed the true nature of a suspected problem in a neighborhood.

■ In the 7th District, an ICAM map showed that the locations of recovered stolen vehicles were clustered around specific abandoned buildings. Armed with this information, police officials worked with the city's Department of Planning to expedite demolition of the buildings.

comes...include: encouraging police/citizen participation in fighting crime [thus] sending a strong message to judges, prosecutors and others in the criminal justice system that the community is involved and watching."<sup>29</sup>

Eileen Donnersberger, manager of the Court Advocacy project, sees ICAM as "a useful tool for deciding what types of cases to follow."<sup>30</sup> For example, an ICAM map might show a series of prostitution offenses occurring at a particular intersection; tracking these cases through the criminal justice system might be an effective strategy for addressing the prostitution problem at that site. Use of ICAM in Court Advocacy units is still new, but Donnersberger sees ICAM as having "tremendous potential." While the advocacy units currently rely on CPD to provide them with ICAM maps, they will soon have direct access to the system.

**Current ICAM limitations.** Although ICAM represents a major improvement in information delivery systems for CPD, its capabilities are still limited. Reported offenses are the only police data that can be mapped—data on calls for service and arrests are not included in the system. Moreover, the offense classification is based only on the facts known at the time the offense was reported. If, after further investigation, the classification changes, a modification would not be reflected in ICAM. In addition, only one offense can be mapped at a time; a map showing the locations of burglaries and drug offenses, for example, cannot be generated. Finally, district personnel can map offenses occurring only within their district. A host of reasons account for these limitations, including time and resource constraints and the requirement that the system be as simple as possible to use. Recognizing ICAM's successes and limitations,

CPD plans to expand usage and training while making major revisions to the system.

## Future ICAM Enhancements

A new CPD directive being implemented in 1996 requires beat officers to bring ICAM maps to monthly beat meetings. ICAM is also being included in the CPD training academy curriculum, so that candidates will be instructed on its use. Other enhancements planned for ICAM will make it more accessible to the public and to the CPD command staff.

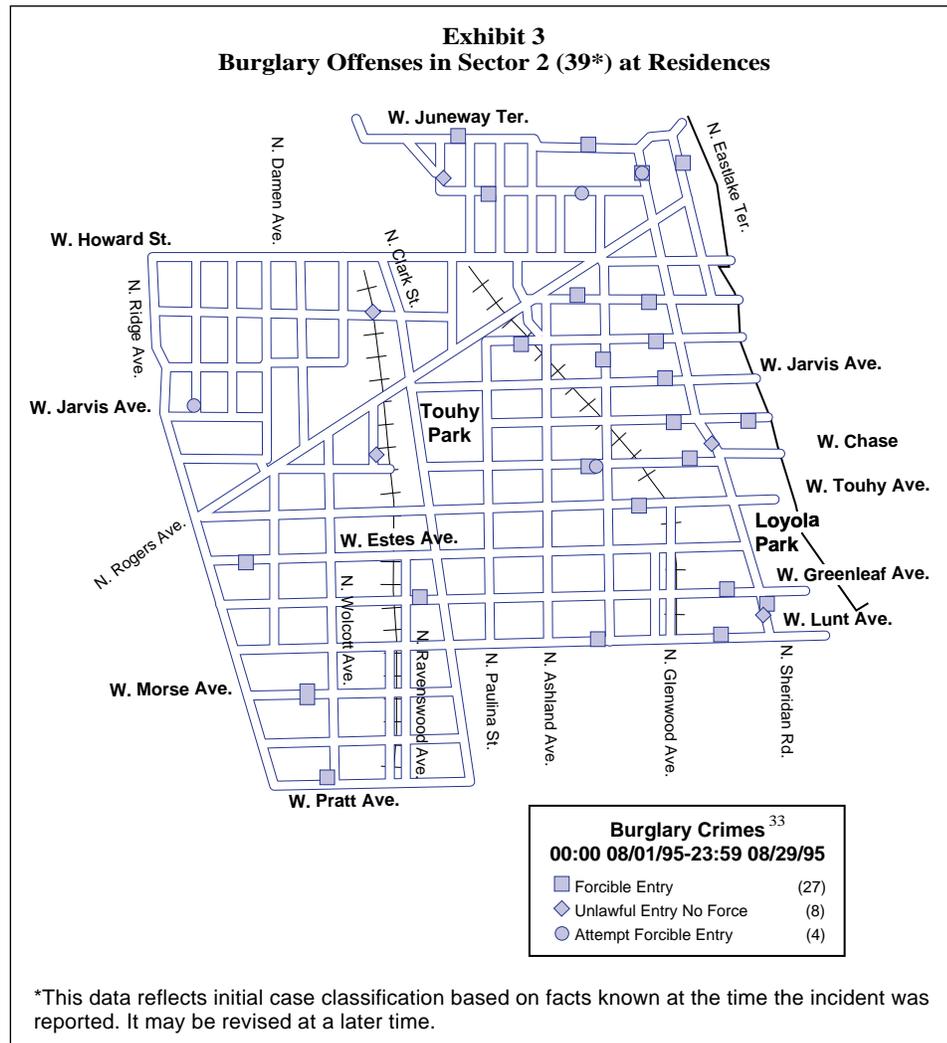
**ICAM 2.** The overhaul of ICAM began in September 1995 with a new system dubbed ICAM 2. As CAPS Co-Project Director Barbara McDonald explained:

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The current version of ICAM has fulfilled its original purpose and has achieved national exposure as an innovative, cutting-edge law enforcement application. It continues to assist in the day-to-day problem-solving activities of police officers and members of the community and is a critical component of the CAPS model, providing useful information directly to the hands of users. However, we now propose a complete overhaul of the ICAM system. When complete, the new system will be known as ICAM 2. It will become more powerful, more flexible, more useful, and more innovative than the current version, yet [it] will become even easier to use.<sup>31</sup>

Superintendent Rodriguez subsequently approved the ICAM 2 development plan. ICAM 2 made its debut in May 1996 in the 3rd and 12th Districts, and citywide installation should be completed by October 1996.<sup>32</sup> Key enhancements include:

■ **Increased public access to ICAM.** Because ICAM terminals are located in secured parts of each district station and certain information available in ICAM cannot be revealed to the community (e.g., the address where the offense occurred), the system is not directly accessible to the public. A modified version of ICAM, one with certain features disabled and some data elements blocked out, is being developed to be made available through two new and innovative ways. One is through public information kiosks. Chicago currently has 50 such



kiosks in the city, which provide (via a touch screen) information on city services and the CAPS program. A prototype touch-screen version of ICAM was recently demonstrated in the 19th District, and an 85-year-old resident (who had never before used a computer) generated a crime map of her neighborhood in less than 1 minute.

In addition, a modified version of ICAM will be available on the Internet via the World Wide Web. Chicago currently has a "Web page" that is a comprehensive source of information on CAPS.<sup>34</sup> Chicago residents who do

not have access to the Internet at their home or office can access the CAPS Web page at the city's public libraries.

■ **Increased police access to ICAM.** ICAM was initially designed as a tool for beat officers. Under ICAM 2, officers and detectives assigned to gang, narcotics, and youth units also will have access to the maps. A modified version of ICAM—the Command Information System—will be developed for the CPD's command staff to support police planning at the sector, district, area, and citywide levels.



At public kiosks, Chicago citizens can learn about city services; soon they will be able to obtain ICAM maps.

ICAM will eventually be installed on laptop computers in CPD patrol cars.

### ■ Access to more information.

The initial version of ICAM allowed officers to access only offenses in their particular district and a limited set of nonpolice data. But the implementation of a new citywide 911 emergency communications system and fiber optic network will link all police facilities and many city agencies, allowing ICAM 2 to access citywide information from several data bases, including calls for service and arrests.<sup>35</sup> Offense data in ICAM 2 also will be more accurate, including updated information on offense classification and case status.

### ■ Analysis capabilities.

ICAM 2 will vastly improve the system's analytical capabilities. It will allow officials to perform temporal analyses (e.g., track changes in the level of crime over time in different geographic areas), exhibit families of offenses on a single map (e.g., crimes against persons or crimes against property), map offenses occurring within a specified distance of a specified location (e.g., produce a map of drug offenses occurring within 1,000 feet of a particular school), and map "hot spots" of criminal activity.<sup>36</sup> The challenge for the ICAM development team will be to provide these new features while preserving the system's user-friendly nature.

## Implications for Other Police Departments

Police departments considering a computerized mapping system have two broad design options: employing trained analysts to produce maps for officers or developing a system similar to ICAM. In the first scenario, trained analysts use commercially available mapping software to either produce a set of prespecified maps on a periodic basis or respond to ad hoc requests by officers for maps.

The second option allows officers to produce their own maps. The benefits

of the ICAM approach are clear, particularly for departments implementing community policing. Since community policing depends on individual officers taking the initiative to solve problems and having residents become active partners in this effort, access to timely and accurate information is essential. While developing an ICAM system costs more than an "analyst-only" system,<sup>37</sup> members of CPD, from the Superintendent to beat officers, strongly urge other departments to consider developing a system that gives officers this direct access.

## Notes

<sup>1</sup>Rich, Thomas F. 1995. The Use of Computerized Mapping in Crime Control and Prevention Programs. *Research in Action*. Washington, DC: National Institute of Justice. NCJ 155182.

<sup>2</sup>Personal interview with Sergeant Mark Stallo, Dallas Police Department, in October 1995.

<sup>3</sup>Personal interview with Officer Angelo Morton, Los Angeles Police Department, in October 1995.

<sup>4</sup>Rodriguez, Matt L. 1993. *Together We Can*. Chicago: Chicago Police Department, p. 13.

<sup>5</sup>The CPD divides the city into five areas; areas are divided into districts; districts are divided into sectors; and sectors are divided into beats. There are 279 beats in the city. The size of beats ranges from 0.31 to 2.54 square miles, with the average size being 0.82 square miles. Eight to nine officers are assigned to each beat, with one or two on duty at any given time.

<sup>6</sup>Responsibility for responding to calls for service within a beat is shared between rapid response units and beat officers. Rapid response units patrol and respond to calls for service throughout a sector.

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<sup>7</sup>The two reports are: Chicago Community Policing Evaluation Consortium. 1994. *Community Policing in Chicago, Year One: An Interim Report*. Chicago: Illinois Criminal Justice Information Authority; and Chicago Community Policing Evaluation Consortium. 1995. *Community Policing in Chicago, Year Two: An Interim Report*. Chicago: Illinois Criminal Justice Information Authority.

<sup>8</sup>Chicago Community Policing Evaluation Consortium. 1995, p. 79.

<sup>9</sup>Criminal Justice Newsletter. 1995. *Community Policing in Chicago Gets High Marks From Evaluators*. Washington, DC: Pace Publications. Volume 26, Number 16. August 15, 1995.

<sup>10</sup>Rodriguez, 1993, p. 17.

<sup>11</sup>Rodriguez, 1993, p. 25.

<sup>12</sup>Maltz, Michael D., Gordon, Andrew C., and Friedman, Warren. 1989. *Mapping Crime in Its Community Setting: A Study in Event Geography*. Washington, DC: National Institute of Justice, p. vi.

<sup>13</sup>Personal interview with Warren Friedman in August 1995.

<sup>14</sup>Block, Carolyn Rebecca, and Richard Block. 1993. *Street Gang Crime in Chicago. Research in Brief*. Washington, DC: National Institute of Justice. NCJ 144782.

<sup>15</sup>From this effort, the researchers developed a handbook that describes the data that could be included in a geographic data base or a geoarchive. See Block, Carolyn Rebecca, and Lynn A. Green, *The Geoarchive Handbook: A Guide for Developing a Geographic Database as an Information Foundation for Community Policing*. Chicago: Illinois Criminal Justice Information Authority, August 1994.

<sup>16</sup>Personal interview with Gerard Ramker and Mark Mattozzi of the Illinois Motor Vehicle Theft Prevention Council. IMVTPC believed that if the 50,000 annual auto thefts in Chicago could be reduced by 10 percent, a \$24 million savings could be realized (assuming a \$4,800 insurance industry cost per stolen vehicle).

<sup>17</sup>This conclusion is consistent with the findings of a recent NIJ assessment of computerized mapping in crime control and prevention programs. See Rich, 1995.

<sup>18</sup>Personal interview with Deputy Superintendent Charles H. Ramsey in August 1995.

<sup>19</sup>The development team decided to change the hardware platform from Sun Unix work stations to PC's running Microsoft Windows. This improved both the speed and ease of use of the system. Microsoft Visual Basic, MapInfo for Windows, and MapBasic for Windows were used to develop ICAM.

<sup>20</sup>Block, Richard. 1993. "Geocoding of Crime Incidents Using the 1990 TIGER File: The Chicago Example" in *Proceedings of the Workshop on Crime Analysis through Computer Mapping*. Chicago: Illinois Criminal Justice Information Authority.

<sup>21</sup>For ICAM and most other mapping applications, geocoding is a two-phase process. During the "automated" phase, the mapping software attempts to assign geographic coordinates (e.g., latitude and longitude) to as many addresses as possible. Next, during the "manual" phase, the user examines those addresses not geocoded during the automated phase one-by-one and attempts to geocode as many as possible. With ICAM, 95 percent of offenses are geocoded during the automated phase. After the manual phase, virtually all the offenses are geocoded.

<sup>22</sup>July 27, 1995, memorandum from CAPS Co-Project Director Barbara McDonald to CPD Superintendent Matt Rodriguez.

<sup>23</sup>Personal interview with Superintendent Matt Rodriguez in August 1995.

<sup>24</sup>Personal interview with Deputy Superintendent Charles Ramsey in August 1995.

<sup>25</sup>Chicago Community Policing Evaluation Consortium. 1995, p. 26.

<sup>26</sup>Hennelly, John. 1995. "You Can ICAM" in *Neighborhoods*. Chicago: Chicago Alliance for Neighborhood Safety. Summer 1995.

<sup>27</sup>Personal interview with Warren Friedman in August 1995.

<sup>28</sup>This story was featured on Chicago Crime-Watch '95, the CPD's cable television program (Karl Productions, Show No. 25, May 1995).

<sup>29</sup>Chicago Community Policing Evaluation Consortium. 1995, p. 75.

<sup>30</sup>Personal interview with Eileen Donnersberger in September 1995.

<sup>31</sup>July 27, 1995, memorandum from CAPS Co-Project Director Barbara McDonald to Superintendent Matt Rodriguez.

<sup>32</sup>Many of the key enhancements are being funded with a grant from the Justice Department's Community Oriented Policing Services (COPS) office.

<sup>33</sup>The icons do not necessarily equal the number of incidents because more than one incident occurred at the same address.

<sup>34</sup>Chicago's Web page can be accessed by pointing a Web browser to <http://www.ci.chi.il.us>.

<sup>35</sup>In light of CAPS, including calls for service in ICAM is particularly important, since calls for service often more closely reflect citizen concerns regarding fear and disorder than reported offenses.

<sup>36</sup>ICAM 2 will eventually integrate a software package called STAC, developed by researchers at the Illinois Criminal Justice Information Authority, which locates clusters of criminal activity in an area.

<sup>37</sup>The ICAM development team had to write software to allow officers to formulate a query and to manipulate the generated maps. The development team recommends that other police departments allow four person-months of time for this software development, assuming the police department has or can gain access to skilled programmers. Development of ICAM required expertise in Visual Basic (Microsoft Corporation), MapInfo for Windows (MapInfo Corporation), and MapBasic for Windows (MapInfo Corporation). This time estimate does not include time to develop systems requirements or to test and install the system.

## About This Study

This Program Focus was written by Thomas F. Rich, an associate in the law and public policy area of Abt Associates Inc. Interviews for this article were conducted with the following members of the Chicago Police Department:

Matt Rodriguez, superintendent; Charles Ramsey, deputy superintendent; Barbara McDonald, director, research and development; Officer Jonathan Lewin; Detective Larry Soltysiak; Gene Chin, senior systems analyst; and the following staff from the 24th District—Commander Thomas Byrne, Officer Valeria Mac, Officer Athena Mullen, and Officer Jerry Martin.

Interviews were also conducted with Warren Friedman, executive director, Chicago Alliance for Neighborhood Safety; Richard Block, Loyola University of Chicago; Carolyn Block, Illinois Criminal Justice Information Authority; Jill DuBois, Chicago Community Policing Evaluation Consortium; Eileen Donnersberger, project manager, Court Advocacy Project, City of Chicago; Sergeant Mark Stallo, Dallas Police Department; Officer Angelo Morton, Los Angeles Police Department; and the following staff from the Illinois Motor Vehicle Theft Prevention Council—Gerard Ramker and Mark Mattozzi.

**On the Cover:** Using the ICAM system, a police officer generates a map of crime offenses in his district. (Photo by Jonathan Cohon)

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