

UC Irvine

I.T. in Government

Title

Police Use of Computers

Permalink

<https://escholarship.org/uc/item/71x0h7hb>

Author

Northrop, Alana

Publication Date

1993-12-01

Police Use of Computers

Alana Northrop



Center for Research on Information Technology and Organizations
University of California, Irvine | www.crito.uci.edu

Police Use of Computers

Abstract

Computerized search systems have been one of the most widely deployed management science technologies in the fight against crime. But how effective are they, and are they being fully exploited? Using data from a repeated-measures field study of police computer users conducted in 1976 and 1988, clear evidence is provided to demonstrate significant growth in the use of such systems and the payoffs from such use. Correlates of use among 822 police professionals in the 1988 study also reveal that poor user interfaces accompany police search systems, and a lack of comprehensive police training in the use of such systems could be undermining their usefulness. It is suggested that the user interface problem is nearly insurmountable for local police agencies but that effective training might be substituted for inadequate user interface design. Recommendations are provided to address the problems of training.

Introduction

President Johnson, in his 1968 State of the Union Message to Congress, announced a grand plan: "To bring the most advanced technology to the war on crime in every city and county in America." In less than ten months, Congress and the President had put into law the Omnibus Crime Control and Safe Streets Act of 1968. Among other initiatives, this law created the Law Enforcement Assistance Administration, LEAA, specifically to deliver on the President's promise of technological assistance. In the following decade, LEAA contributed nearly \$50 million to state and local government criminal justice and law enforcement agencies to fight crime. This funding was overmatched by other federal agencies such as the FBI and the states and local governments themselves. LEAA's mandate to "assist" was broad, but a large share of its technological assistance was aimed at adding the powerful tools of management science and information systems to the fight against crime (White, Radnor and Jansik, 1975; Twentieth Century Fund, 1976).

Over two decades have passed since LEAA first began its effort to bring technology to the fight against crime. In the mean time, and despite the abolition of LEAA itself in 1982, the myriad agencies that make up the criminal justice system of the United States embraced management science and information systems with varying degrees of enthusiasm. A central focus of this initiative was extending techniques to improve deployment of police resources that had been started in the mid-1960's aimed at optimizing patrol force allocation (Larson, 1967; Gass, 1968; Gray, 1971; Larson, 1972; Chaiken, 1978; Chaiken, et al., 1977; Green and Kolesar, 1984; Lawless, 1982, 1987.)¹ Some were aimed at trying to understand the "systematic" character of the criminal justice system from an analytical perspective (Blumstein, 1976; White and Krislov, 1977; Zenk, 1979). And some focused attention on challenges and controversies involved in major efforts to develop and implement complex systems for support of prosecution and maintenance of criminal history information (Weimer, 1980; Laudon, 1986). Less

attention has been paid, however, to the practical effects of these information systems on those who wage the fight against crime at street level – the police (Colton, 1978, 1979; Leonard, 1980).

The extensive investments made in computerized information systems for police use over the past two decades have not been accompanied by systematic assessments of these systems. Earlier research into the uses and payoffs of computers in police agencies suggests that there are real and substantial benefits from use of the systems (Leonard, 1980; Kraemer, Dutton and Northrop, 1980; Danziger and Kraemer, 1986; Northrop, Kraemer, Dunkle and King, 1990). However, the benefits described are difficult to quantify in a manner that yields convenient cost-benefit calculus, and given the one-time, cross-sectional nature of these studies except the Northrop one, it has not been possible to ascertain trends over time. Computers are now an irremovable part of the arsenal of the fight against crime. But what difference have they made, and have they truly been exploited to the extent hoped for when President Johnson made his bold speech in 1968?

This paper reports results from a comprehensive repeated-measures field study of the uses and effects of computers by police in the fight against crime. The paper focuses on a particular class of computer use, searches for vital information, that constitute the bulk of police computer activity. The results suggest that computerized search capability is widely and routinely used by both patrol officers and detectives, and that such uses are valued by the police in their fight against crime. Moreover, the data show a clear improvement in both use of and benefits from such systems in the years between 1976 and 1988. It appears that the information systems component of the management science crusade against crime has yielded widespread adoption and positive results. However, in keeping with the account by Lawless (1987) of model implementation in police departments, we conclude that the investment in search systems and the promise they

hold for improving police effectiveness is badly constrained by inadequate training of both patrol officers and detectives. Suggestions for a remedy to this situation are provided. The paper concludes with general observations about the substitutability of training for inadequate system design.

Methods

Data reported here are drawn from the URBIS project, a multi-year study of computerization in U.S. local governments.² The data are drawn from two panels of survey administration and interviews in cities over 50,000 in population, one in 1976 and one in 1988. Forty two cities participated in the 1976 study, selected according to each city's profile in use of various policies for the management of computing. Most of these cities were revisited in 1988, with essentially the same interviews and surveys administered to the same role holders (though usually not the same individuals).³ Generally, the cities visited are among the leading edge of local government computer using organizations.

The study surveyed and/or interviewed an average of 100 persons in each city, for a total of 4,940. An 80% response rate was achieved for the self-administered survey portion of the study. Though a wide variety of role holders were surveyed (e.g., policy makers, department managers, staff professionals), this study focuses on a class of "street-level professionals" – police detectives and patrol officers (Danziger and Kraemer, 1986). Response to questionnaires from patrol officers was 468 in 1976 and 420 in 1988; response from detectives was 435 in 1976 and 385 in 1988. Similarly, the project measured a wide variety of uses of computerized information systems (e.g., calculating and printing, record searching, record restructuring, analysis), but only the record searching function is investigated in detail here. The explanation for this choice is elaborated below.

The measures used in this study depend heavily on self-reports and recall of survey respondents. These perceptions and recollections are arguably less precise and reliable than more direct measures. This caveat is noted. However, we believe these self-reports are generally useful indicators for the purposes and among the population we are concerned with. We also have augmented our interpretation of the results of our analyses with insights gained from personal interviews with more than 100 detectives in the study cities.

Police Use of Information Systems

James Q. Wilson, in his classic book, *Varieties of Police Behavior* (1968:57-64), noted that the chronic lack of adequate information is the paramount difficulty facing law enforcement leadership in the fight against crime. This lack ranges from the police chief's shortage of information on how to deploy the department's limited resources, to the practical problem of each patrol officer's uncertainty over whom to stop and question regarding suspicious behavior. The multi-faceted management science approaches of the 1970's and early 1980's addressed the former problem with significant payoffs. The latter problem – the challenge of improving the information provided to the patrol officer in the street or to the detective working a case, was not amenable to such approaches. Rather, as Wilson pointed out, the only source of information on how to deal with specific individuals or cases was existing records. And the only means of using those records was to "look something up." Thus, records and searching form the core of the information systems that support the patrol and detective functions of the police.

Our research shows that record searches overall lead the list of important classes of computer use by local government professionals. Among a total of eleven classes of use studied in the 1976 and 1988 surveys, computerized searches were the task performed by

the largest number of survey respondents in 1988 (Table 1). It is important to note here what is meant by "search" in this context. The term could conceivably mean anything from selected retrieval of records in a data base to looking through directories for particular files on a PC. However, the particular search applications we focused on in our studies are those that depend uniquely on computerized records and data bases and that are performed as essential components in doing one's job.

Insert table 1 here

The outstanding users of computerized search capabilities in local governments are police professionals. Both detectives and patrol officers make heavy use of such systems – more than non-police employees (Table 1). Also, unlike most other local government professionals, their use of search capabilities constitutes almost their entire computing activity. Non-police users as a whole use the computer fairly often to code and enter data, process text, construct or update files, and perform financial or budgetary calculations. In addition to searches, detectives and patrol officers do a modest amount of coding and data entry and text processing, and little else. Despite the similar frequencies of search-related uses of computers among patrol officers and detectives, the character of each group's uses of computer systems is noticeably different.

Patrol Officers and their Search of Computer Files

Patrol officer use of computers is directed mainly toward routine "lookups."⁴ These are queries to determine the law enforcement-related status of an individual or a piece of property. Common example of such lookups are searches for outstanding wants and warrants on an individual or searches for auto license numbers reported for stolen vehicles. When a patrol officer stops an individual and requests identification, he or she often uses identifying information such as name, driver's license number, and so forth to execute a search of computerized data to determine whether the individual is wanted by

law enforcement agencies locally or even nationally. Finding an outstanding want or warrant in the system is sufficient cause for the officer to arrest the individual for further investigation. Similarly, patrol officers use the license numbers of automobiles to determine whether a vehicle is stolen or is otherwise wanted for investigation (e.g., reported at the scene of a crime). These two kinds of lookups are by far the most common searches performed by patrol officers, and in many law enforcement agencies the systems required to do such lookups have been streamlined to permit officers in the field easy and rapid access to both via radio request to a person using a terminal at a base operation or directly via computer terminals in their cars.

As shown in Table 2, nearly three-fourths of all stops by responding officers in 1988 resulted in wants and warrants searches, a statistically significant increase of about 11% from the frequency of searches for routine stops in 1976. Similarly, about two-thirds of all vehicle stops and inspections resulted in searches of stolen vehicle files, about the same fraction as found in 1976. Interestingly, between 1976 and 1988 the quality of the systems and/or the quality in police officer use of the systems appear to have increased because there was a significant increase in the proportion of "hits" (discovery of an outstanding want or warrant) on individuals and a corresponding decrease in the frequency of mistaken detentions due to incorrect system information during this period.

Insert table 2 here

Detectives and their Search of Computer Files

Detective use of computers includes some lookups – detectives make use of both stolen vehicle and wants and warrants files – but their main uses of computerized searches involve much more analysis than do those of patrol officers. Criminal investigations usually begin with the report of a crime and an initial set of facts and statements gathered

from victims, witnesses, and other law enforcement personnel. If this initial information provides sufficient evidence to arrest suspects and provide the local prosecutors with a strong case for prosecution, the investigation might end there. But with many cases, a detective must gather and collate additional information from a variety of sources to identify suspects and build an investigation leading to arrest and conviction. As with patrol officer use of computerized systems, there are several standard sources of information available. Most notable are the national, state-wide, and local computerized criminal history files. These provide information on individuals' criminal histories, and together with want and warrant information, they can be valuable in identifying likely suspects or in providing cause to arrest and detain a suspect for closer investigation.

Unlike patrol officer use of computerized search, however, detectives often have access to special systems developed in their own agencies or by regional or state agencies. For example, detectives might have access to field interrogation report files that provide recording of and computerized search capability of all patrol officer encounters with individuals by time of day, location, reason for interrogation, and so on. This can help pinpoint suspects in the vicinity of a crime scene at a particular time. Also available are alias files, which provide all known aliases of individuals who have come in contact with the law enforcement agencies in the past. These are useful for linking particular individuals to crimes in which their aliases have been noted. Of particular usefulness to some detectives are systems permitting lookup of "known associates," which provide information facilitating detective investigations through social networks of criminals in search of particular suspects. Also unlike the situation with patrol officers, the systems available to detectives are often scattered and unintegrated. It is frequently necessary for a detective to move from system to system to perform searches, sometimes having to literally turn physical switches or change computer terminals to gain access to the files desired. Searches in such instances can be time consuming and frustrating, and they

require detectives to glean information from different sources and piece the information together into a coherent whole via manual methods.

Despite the problems, detective use of computerized search systems is substantial and has grown in the past decade. As shown in Table 3, the average number of cases assigned to detectives per month has not changed much between 1976 and 1988, but the frequency of use of computer files in active investigations increased significantly during that period from slightly less than 60% to over 80%. Also, the data show significant increases due to computing use in the proportion of arrests in cases, the number of cases cleared, and the number of in-custodies linked to uncleared cases. The number of cases that would have been unworkable without computing and the number of cases that would not have been cleared without computing also rose significantly. In summary, by 1988 more than 80% of cases were being investigated through use of computer systems, and computer systems were identified as essential in clearing more than half of cleared cases.

Insert table 3 here

Another Look at Police Use of Computers

The use of computers has clearly had an effect on the jobs of patrol officers and detectives. A similar positive view is presented in Table 4. Table 4 compares the responses of patrol officers and detectives to questions about the effects of computer use on routine work. More than two-thirds of both groups felt that computers enable them to be more effective in their work, and half or more felt they would not be able to do as many things as they presently do in their jobs without computers. With respect to getting information to do their jobs, detectives and patrol officers are, if anything, enthusiastic users. An overwhelming 85% of the detectives say that computers have made it easier to get the information they need and that they save time in looking for information. The

patrol officers are nearly as enthusiastic. Detectives lead the patrol officers in claiming that computers make more information available than was previously. However, it is the patrol officers who lead detectives in claiming that computers provide more up-to-date information than that available in manual files and that computers provide precise information needed in their work (reverse-coded item). Given the "real-time" nature of patrol officer searches, i.e., they need to know immediately and accurately whether a person is wanted for arrest or a vehicle has been reported stolen, these results are strong testimony to the useful effects of computer use on law enforcement. Our findings corroborate other careful studies of the use of information systems in police work, both in the U.S. and abroad (Hastings, 1982; Helsinki Institute, 1987; Morgan, 1990).

Insert table 4 here

With respect to "problematic" consequences of using computers, detectives and patrol officers find some difficulty in getting incorrect computer-based information changed or corrected.⁵ This stands to reason, given the character of these sensitive systems, which are often administered and maintained by agencies at the regional, state, or national level, and that usually are surrounded by strict access protocols. Also, detectives and patrol officers report a sizeable need for special programming to get required information (Table 4).

Correlates of Computerized Search System Use

As the foregoing analyses suggest, there have been major increases in police use of computerized search systems since 1976. But not all police officers surveyed use the systems with equal enthusiasm or with equal positive results. What accounts for the differences in use of these systems among patrol officers and detectives?

The key elements involved are the characteristics of the innovation and the characteristics of its users (Davis, Bagozzi and Warshaw, 1989). Both are assumed to be changeable over time, with the characteristics of the innovation undergoing improvement through design and production changes, and the characteristics of the users undergoing improvement through familiarization and accrual of expertise. This general model of innovation dynamics has become a major focus of the recent literature on the economics of technological development and change (Rosenberg, 1982; Dosi, et al., 1988). In the following sections we explore how characteristics of the innovation (the user and technical friendliness at the computer systems) and how characteristics of the users (their years of experience working with computers, and any coursework directly dealing with computers and their formal training) influence police turning to the computer more frequently.

Characteristics of the Innovation

Specifically, the use of an innovation such as a computerized search system will depend on the useability of the system. Systems that are difficult to understand will present impediments to initial use and will discourage subsequent use. As a result, we propose two hypotheses:

H1: Use of computerized search systems will be greater when the systems are easy to understand and use. "User friendly" systems invite initial trial, experimentation and exploration that will form a base of subsequent, routine use.

H2: Use will be greater when computer systems are technically stable and reliable. This hypothesis should be confirmed because unstable and unreliable systems – what we call "technically unfriendly" systems – are discouraging for users, interfering with and interrupting their work, and creating additional work as mistakes must be corrected and workarounds developed and implemented.

User friendliness is, not surprisingly, associated with frequency of use (Table 5). The technical stability of the systems is also associated though to a lesser degree than user friendliness.

Insert table 5 here

When computer systems are important adjuncts to work, and particularly in cases where formal training is scarce, it stands to reason that easy apprehendability and applicability of computer systems will facilitate use by facilitating self-training. Users of systems that are important to their work will, in a sense, demonstrate inelastic use behavior over a wide range of technical stability. Systems important to ongoing work will be used even if far from perfectly reliable, and workarounds will be developed for times when the systems are not operating properly (Gasser, 1988). Nevertheless, extent of use will be affected by instability because of the ecology of information handling that appears in police work. Police, and particularly detectives, have been in the business of gathering, managing, and analyzing information since long before computerized systems became available. Techniques for handling information that have evolved over decades still remain, in part because they provide essential backup to more modern techniques and in part because they handle cases that modern techniques do not. Thus, given a range of options for handling information in a given situation, a police officer or detective will select the option most readily available, reliable, and effective. The mix of availability, reliability, and effectiveness is the determinant of choice. Decreased reliability of a system due to instability will render it less used overall, even if the system is near to hand (working or not) and highly effective. The work goes on regardless of whether the systems are running or not. And, as shown by the work of Davis, Bagozzi and Warshaw (1989), a powerful determinant of whether computer systems are used is "perceived usefulness." The data shown in Tables 2 and 3 indicate a high degree of perceived

usefulness in the systems, which suggests that police users are willing to use the technology as long as accessibility, stability, and reliability meet some minimal thresholds.

It is also worth noting that the search systems used by patrol officers and those used by detectives vary considerably in their origins and design features. The wants/warrants and stolen vehicle search systems available to police are generally designed precisely for the purpose they serve for officers on patrol. These systems automate and make available records issued by authorities with a specific action in mind (e.g., a warrant to arrest Joe Jones, or a notification that a specific car has been reported stolen). Colton (1978) observed this trend, and by the late 1980's, a large array of dedicated systems to support rapid provision of "lookup" information to officers in the field had been deployed (McDonell, 1982). Accessibility, reliability, and stability are surely key enablers for patrol officer use of such systems. The officers themselves are physically cut-off from the data bases they need, and depend on a delivery system that includes a number of technological and human intermediaries. Thus, the role of innovation characteristics in the use of such systems by patrol officers is likely to be binary: the systems either work or they do not.⁶

Detective systems are somewhat different. Detectives use the systems that serve patrol officers when appropriate, but they rely much more on search systems that were never designed to support criminal investigations but, rather, were designed to support required record keeping as part of the criminal justice system or other public services. In fact, the very notion of information systems as a special focus for police administration is quite new and has yet to replace the traditional "records and communications" label in most departments (McDonell, 1982). Important investigative systems such as the various criminal history files record for lookup information that is documentary and archival – for

example, that Joe Jones was arrested, tried, convicted, and sentenced for given crimes on particular dates – have always been required as part of the criminal justice system, and the systems to automate such record-keeping were designed to facilitate just that record-keeping. Detectives often find these systems to be unsupportive of investigative work, and even the systems that have been built to "tie together" such records systems for detective use are cumbersome because the underlying records systems are not designed for those tasks. Detectives are avid users of the records systems they have available, but they frequently complain about the difficulties they face in using such systems. It is possible that the availability of more comprehensive, friendly investigation support systems would produce a jump in the measure of correlation between technical friendliness and extent of use.

Characteristics of the User

Use of computers in any professional task requires some minimum level of skill and preparation. If nothing else, it requires the skill set of the profession itself. We anticipate that both literacy of and experience with computers will be associated with frequency of use of computers in professional tasks. Hence we postulate three hypotheses:

H3: Use will be greater among employees with higher computer literacy in the form of course work than among employees with lower computer literacy. Literacy begets confidence, which in turn should enable greater use of the technology.

H4: Use will be greater among employees with more experience in using computers than among employees with less experience. Past direct involvement in using a computer or computer-generated information should beget confidence in and knowledge about use of the computer, and increase reliance on computer support.

H5: Use will be greater in the presence of more formal training in computer use. Training gives new users the essential base of skills required to master the technology and put it to work in their jobs.

The data shows that for detectives use is weakly but significantly correlated with both literacy and experience. For patrol officers literacy is weakly but significantly correlated with frequency of use but not with experience. Finally, formal training appears to be more associated with frequency of use for patrol officers and detectives than is their computer literacy or experience.

The data are likely indicating that formal training on the job is more directly applicable to helping police use computers to do their job than outside coursework and their own years of experience. The reason experience pays off to the extent it does for detectives and not patrol officers is likely explained by the nature of their work. Patrol officers do "look ups," fairly simple searches with systems designed for that very use. In contrast, detective searches can be complex ranging over several systems, none designed for them but rather for the criminal justice system.

Summary

Overall, our findings suggest that both characteristics of the innovation and characteristics of the user appear to be associated with extent of use. User friendly systems and formal training appear to be the key variables, with technical friendliness, computer literacy, and prior computer experience showing less close associations.

Discussion

Our findings are hardly shocking: both characteristics of the innovation and characteristics of the users are associated with extent of use. It seems safe to say that improved systems and more knowledgeable users will result in greater use of the systems. But this is trivially true, assuming it is true. The question of interest is whether improvements in these two factors would lead to greater exploitation of the innovation in

the fight against crime. Our focus now turns to the "improvability" of systems and users, and in particular, to the issues of user friendliness and training that dominate our findings. In this section, we move beyond the findings from the empirical analysis to some conjectures about the meaning of the findings in light of our extensive case-study work among criminal investigators who use computerized search systems.

As suggested above, there are real opportunities to improve the user friendliness of the computerized search systems that police in our study cities have available. This is particularly true for systems to support detectives. The systems most detectives use are very cumbersome and difficult to use, particularly for collating leads and information from a variety of sources. No doubt improvements in these systems would benefit police work and increase use of the systems. However, it is highly unlikely that local law enforcement leaders can bring about the needed technical changes. The reason for this concerns the difference between police work and the nature of crime fighting. Police agencies are organized into clear jurisdictions, with the bulk of law enforcement activity at the local level. Resources for law enforcement are mainly provided by municipalities. Criminals, however, are no respectors of political boundaries, and practice their trade across city, county, and state lines. Thus, any effort to broaden the scope of search systems to capture the likely "territory" of criminals must depend on cooperation among many agencies. And, not surprisingly, this is precisely what happened in the creation of the search systems that currently exist.

Existing police search systems were, by and large, developed and deployed by umbrella agencies operating at the regional, state, and national level. Local governments are generally reluctant to contribute resources "upward" in the federal system. They tend to see it as the job of federal and state authorities to contribute resources "downward." Most of the search systems were paid for by federal and state funds. They were designed not to

facilitate the working styles of local law enforcement, but to tie together the information sources of numerous agencies, and to make that information available to all contributors. To be even minimally effective, the systems had to be deployed widely, which often meant deployment sufficient to meet the lowest common denominator of capability. To be maintained, the systems must be standardized, and after two decades of deployment, they constitute a huge installed base that cannot be modified inexpensively. Certainly, individual law enforcement agencies cannot effect major changes in the systems. The drastic reductions in federal funding for local law enforcement improvement in the 1980's has made it virtually impossible to mount expensive system overhauls designed to improve user interfaces and accessibility. The current systems are doing well simply to stay alive. We doubt seriously whether the full potential of police search systems will be achieved through technical improvements in the near future, simply because of the political and economic constraints on doing so.

Fortunately, however, a strong argument can be made that training is not merely a complement to innovation, but a substitute for features of the innovation, and in particular, those features related to user friendliness. As suggested earlier, perceived utility is a powerful motivator for use of computer systems. With sufficiently high perceived utility, a user might be willing to engage even a terribly unfriendly system and master its quirks. This is, in fact, what happens in most police use of computerized search systems: they simply learn how to use them no matter how bad the systems are. We believe that training as a substitute for user friendliness is an important strategic notion for local law enforcement agencies wishing to exploit computer systems controlled by outside authorities. Our focus now shifts to the question of how well local law enforcement agencies do with respect to training for use of their search systems.

A frequent complaint heard among police professionals during our field work was that they receive far too little training in use of computerized search systems. As shown in Table 6, only about one in ten police professionals receives training from computer professionals. One out of two receive training from co-workers or police supervisors, and one out of five train themselves. Further, it is interesting to note that around 40% of police professionals receive no formal training at all, and another 1/5 receive less than two hours of formal training. Around one in four detectives and one in five patrol officers receives 3-10 hours of formal training, and about one in eight receives more than 10 hours. In contrast, both detectives and patrol officers spend considerable time training themselves to use computers. Slightly less than one-third have spent 3-10 hours in self training, while more than one-third have spent more than ten hours in self training.

Insert table 6 here

Table 6 also provides a glimpse at detective and patrol officer attitudes toward the training they have received. More than two-thirds of both groups rated the formal training they received to be less than needed. About one-quarter of detectives and one third of patrol officers rated the amount of training about right. Only 6% of detectives and 4% of patrol officers said they received more training than needed. It is also useful to note that it is the amount of training received that is of major concern. Both detectives and patrol officers showed relatively little concern over the timing of the training they received: about half said the timing was right, and the balance was split over whether the training came too early or too late. There was also less concern over the quality of the training, with more than one-third of both groups feeling the training was adequate, somewhat more than one-third claiming it was less than adequate, and around one-fifth claiming the training was more than adequate.

Given the instrumental importance of computerized search capability for police professionals, it seems strange that so little attention has been paid to the need for training. During our field work it became clear that the IS professionals who provide service to the police recognize training as the most seriously neglected aspect of support. Apparently, the administrative responsibility for training usually falls between the cracks of hierarchical authority in police agencies. It was not clear whether training in use of computerized systems was fundamentally the job of the IS professionals or the police supervisors and trainers from whom most other training comes. Each of these groups usually had higher priorities to deal with, with IS professionals concerned with keeping the technical base of operations going, and police supervisors and trainers concerned with getting critical police work done. In each department there were notable "computer whizzes," particularly among the detectives. These individuals stood out as likely candidates to perform training, but invariably these whizzes were highly experienced in other aspects of detective work as well. Pulling them off important case work to deal with training was simply not a workable solution. In none of the departments we studied were there highly successful training programs for computer use among police professionals.

The police profession generally appears to be lacking in attention to the crucial need for training in the use of computerized search systems. A review of several leading authors on police training revealed, at best, superficial commentary on the matter. Trautman (1986) mentions that officers should be trained in use of computer systems but only in the context of the traditional "records" function. Chapman (1982) notes that training should be handled "systematically," but nowhere mentions that training in use of information systems should be required. The Helsinki Institute (1987) makes the general declaration that support and training of criminal justice personnel should be an integral part of police

training programs but says nothing about what this training should consist of or how it should be done. Indeed, as Holden points out in his study of police training in the United Kingdom, the vast majority of patrol and investigative training time (excluding physical training) is devoted to criminal law and administrative procedure, and essentially none is dedicated to mastering the collection and use of information. He argues that the UK's police training traditions are similar to those found in the United States. Our field work supports his conjecture.

Conclusion

Computers are now important weapons in the fight against crime. To a remarkable degree, computer search capabilities have proven to be a valuable tool in police work. In fact, police officers who are usually quite busy and focused on their work take considerable time from their otherwise crowded schedules to learn to use computer systems on their own – significant testimony to the value of the technology. The evidence above also suggests that the full utilization of computer search capabilities will depend on improvements in both the user friendliness of the systems themselves and in training of police professionals in use of the systems. We note earlier that, desirable as improvements in user friendliness might be, they are difficult for local agencies and users to effect.

Local police administrators do have the option of improving training in use of the systems, and we believe training can in many cases be a substitute for unfriendly system design. Training is required for almost all successful use of complex technologies. Research has shown it to be an essential part of computing infrastructure, a part of the "package" of hardware, software, skills, and administrative protocols and programs necessary for exploitation of the computer's potential (Kraemer, King, Dunkle and Lane, 1989; Kling, 1991). Weaknesses in the training component of the package are not unique

to police agencies – they are found in many professional work settings that depend on computing systems. We see training as essential to construction and maintenance of what Weiss and Birnbaum call the "network of relationships" that enables technological infrastructure to sustain use of an innovation (Weiss and Birnbaum, 1989;1018). Only through adequate training can police users of search systems begin to understand the vital link they play as both consumers of information from the systems and suppliers of information to the systems. For the first time in the history of police record keeping, the officers on the street are getting something back for the investment they must make in supporting those records systems. Training is the key to situating the police officer in the network of relationships that make computerized search systems effective in the fight against crime. Heavy federal, state, and local investments in computing systems to support police agencies have been productive but not as productive as they might have been. Failure to invest in the development of sufficiently comprehensive and effective training, particularly training geared to the special work world of police professionals, has been a major oversight.

We recommend attention to this problem at several levels. We suggest that programs of instruction in uses of computer systems be strengthened at the academy level. In particular, we suggest that police cadets be instructed in the role of information in the larger milieu of police work and not just in the protocols required to do wants/warrants and stolen vehicle searches. Patrol officers have relatively limited investigative responsibilities, but they are nonetheless criminal investigators, and they are usually the first police professionals to arrive at the scene of crimes (Hale, 1982; Holden, 1986; Trautman, 1986). A broader understanding of the web of information on which detectives depend, and the keys with which detectives begin their searches through that web, should be of instrumental use to patrol officers both immediately as they begin patrol work and later on as those selected to become detectives take up criminal investigations.

We also suggest that training for detectives not be focused exclusively on strict, by the book classroom training, though this has its place, but rather that it be provided mainly through demonstration and consultation services on an ongoing basis. Useful research by Lakhanpal (1988) has demonstrated that consultancy-oriented training support is more effective at helping professional end-users of computing systems master the capabilities of computer systems than is by the book classroom training. We believe this will be particularly evident in detective work, where the training field is literally the field itself.⁷ It is virtually certain that the consultant-trainers for detectives should be drawn from the ranks of successful criminal investigators who themselves have been creative users of the systems, and who have gone for special training in the full capabilities of the systems and the special techniques for using them in criminal investigations. These expert consultants should be present in all large departments and available to assist smaller departments.

A significant fraction of each agency's computer systems budget should be reflected in an accompanying training budget. The under investment in training for use of police computer systems constitutes a significant opportunity loss for police agencies. Failure to invest in training is false economy, given the underutilization of a very expensive police computing infrastructure built up over the past twenty years. The value of these systems has been demonstrated by the sharpest possible measure: that police agencies continue to invest in and support them despite severe fiscal constraints. Police use of computers is not a fad; it is a routine reality of police work in the 1990's, and police dependence on these systems will continue to grow. Investment in training is long overdue.

Finally, we believe each large department and consortia of smaller departments, with the help of state and federal agencies, should maintain ongoing programs of research and development to improve the systems themselves and the ways they are used in police

work. As the findings above show, friendly systems are used more regularly. Much can be done to improve the user interfaces and flexibility of police computer systems, particularly those used by detectives. Moreover, as use of these systems becomes more central to police work, the inevitable questions of the legal role of such systems in police actions will grow as well. We live in a turbulent time when questions of privacy, civil rights, and the authority of the police are subjects of intense debate. Questions of probable cause for search and seizure, detainment, arrest, and booking increasingly involve issues of information: where it comes from, how it is delivered, and whether it is "good" information on which to make such important decisions. A key issue in training police professionals is making sure they know how to do the right things, and not just how to do things right. Computers are useful tools in the police toolkit. It is time to raise the use of them to a higher professional standard through focused training programs.

¹ The idea of improving police operations through use of scientific methods was not new. Larson (1972) notes that systematic studies in Minneapolis in the 1930's (Vollmer, 1930) paved the ground for Wilson's (1941) and Leonard's (1951) books that set the practices for patrol force allocation that survive to this day, and that were the foundation for subsequent application of management science techniques. This line of work has not been limited to law enforcement, but has been applied generally in the public sector. See Walker (1981) and Kraemer and King (1986) for examples of more general application efforts.

² URBIS stands for Urban Information Systems. The project began in 1972 and continues to the present, and is carried out by investigators at the Center for Research on Information Technology and Organizations, University of California, Irvine. Support for the research has come mainly from the U.S. National Science Foundation and IBM Corporation. The study's methods are described in great detail in Kraemer, Dutton and Northrop (1980).

³ All 42 cities from 1976 were asked to participate in the 1988 study. A total of 38 did so. Additional cities were added in 1988 to compensate for the missing four cities from 1976, and to capture four cities that exhibited particularly interesting uses of computing. The cities studied in 1988 included Albany NY, Atlanta GA, Austin TX, Baltimore MD, Bellevue WA, Bloomington MI, Boulder CO, Brockton MA, Burbank CA, Charlotte NC, Chesapeake VA, Cleveland OH, Costa Mesa CA, Evansville IN, Ft. Lauderdale FL, Grand Rapids MI, Hampton VA, Kansas City MO, Lancaster PA, Las Vegas NV, Lincoln NB, Long Beach CA, Miami Beach FL, Milwaukee WI, New Orleans LA, New Rochelle NY, Newton MA, Oshkosh WI, Paterson NJ, Philadelphia PA, Phoenix AZ, Portsmouth

VA, Provo UT, Quincy MA, Richardson TX, Riverside CA, Sacramento CA, San Francisco CA, San Jose CA, Seattle WA, Spokanne WA, St. Louis MO, Stockton CA, Tampa FL, Warren MI, and Warren OH.

⁴ The descriptions rendered here of patrol and detective use of search systems are drawn mainly from field interviews in the URBIS study. Additional discussions of the ways such systems are used by police officers can be found in Colton (1978), McDonnell (1982), Holden (1986), and Danziger and Kraemer (1986).

⁵ Laudon (1986) suggests that the problem of incorrect information in police search systems can indeed be serious. His detailed study of computerized criminal history systems in the states revealed high levels of error in those systems' records. These systems are typically administered by levels of government above the local level (e.g., regional, state, national), and authority to change entries is restricted to those higher levels. Thus, information known by a local agency to be incorrect is not easy to change, and often will not be changed simply because making the change requires too much effort. This is a most serious impediment to effective use of search systems, particularly in detective work, where incorrect information can lead to improper arrests, failure to arrest active criminals, and wasted time pursuing dead-end leads.

⁶ A possible innovation of importance here is the so-called mobile terminal unit, which is essentially a computer terminal in the patrol car. This terminal can provide direct officer access of data bases, thereby elimination human intermediaries in the lookup process. As far as we know, there are no systematic studies of the effects of mobile terminals on patrol officer use of data bases. However, investigations of controversial events in the Los Angeles Police Department have shown that these terminals, deployed widely in the

LAPD, are used extensively for car-to-car communications, often on matters having little to do directly with patrol duties (Los Angeles Police Commission, 1991). This outcome in use of new communications technologies has been seen before, particularly in the intensive person-to-person communications use of the ARPANet facility that was originally designed to facilitate investigator access to remote computing resources (BBN, 1981; Sproull and Kiesler, 1991).

⁷ This recommendation fits well with the old adage that police learn real police work on the street. It is just an updating of that notion, recognizing that a lot of police work is done now not on the streets but by computer terminals. Moreover, the set of recommendations also fits well with Talley's (1984) and Ness's (1991) studies that show that the best training is that which is geared to specific job tasks.

References

- BBN (Bolt, Beranek and Newman, Inc.). (1981). *A History of the ARPANET: The First Decade*. Arlington, VA: Bolt Beranek and Newman.
- Blumstein, A. (1976). Analytical inputs in the developing debate on crime-control policy. In Brounstein, Sidney H. and Kamrass, Murray (eds.) *Operations Research in Law Enforcement, Justice, and Societal Security*. Lexington, MA: D.C. Heath and Company, p. 3-11.
- Chaiken, J. (1978). Transfer of emergency service deployment models to operating agencies. *Management Science* 24():719-731.
- Chaiken, J, Crabill, T., Hollidah, L., Jaquette, D., Lawless, M., and Quade, E. (1977). Summary of operational criminal justice models. In Nagel (ed.), *Modeling the Criminal Justice System*. Beverly Hills, CA: Sage, p. 29-40.
- Chapman, S.G. (1982). Personnel management. In Garmire, Bernard L. (ed.), *Local Government Police Management. Second Edition*. Washington, DC: International City Management Association, p. 241-273.
- Colton, K. (1978). *Police Computer Systems*. Lexington, MA: Lexington Books.
- Colton, K. (1979). The impact and use of computer technology by the police. *Communications of the ACM* 22():10-20.
- Danziger, J.N. and Kraemer, K.L. (1986). *People and Computers: The Impacts of Computing on End Users in Organizations*. New York: Columbia University Press.
- Davis, F.D., Bagozzi, R.P., and Warshaw, P.R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science* August, 35(8):982-1003.
- Dosi, G., Freeman, C., Nelson, R., Silverberg, G., and Soete, L. (eds.). (1988). *Technical Change and Economic Theory*. New York: Pinter Publishers.

- Gass, S. (1968). On the division of police districts into patrol beats. In *Proceedings of the 1968 ACM National Conference*. Princeton, NJ: ACM.
- Gasser, L. (1988). The integration of computing in routine work. *ACM Transactions on Office Information Systems* July, 4(3):205-225.
- Gray, P. (1971). Robbery and assault of bus drivers. *Operations Research* 19():257-269.
- Green, L. and Kolesar, P. (1984). The feasibility of one-officer patrol in New York City. *Management Science* August, 30(8):964-981.
- Hale, C.D. (1982). Patrol administration. In Garmire, Bernard L. (ed.). *Local Government Police Management. Second Edition*. Washington, DC: International City Management Association, p. 115-133.
- Hastings, T.F. (1982). Criminal investigation. In Garmire, Bernard L. (ed.). *Local Government Police Management. Second Edition*. Washington, DC: International City Management Association, p.160-180.
- Helsinki Institute. (1987). *Computerization of Criminal Justice Information Systems: Realities, Prospects, Methods and Effects*. Helsinki, Finland: Helsinki Institute for Crime Prevention and Control.
- Holden, R.N. (1986). *Modern Police Management*. Englewood Cliffs, NJ: Prentice-Hall.
- Kling, R. (forthcoming). Behind the Terminal: The hidden power of computing infrastructure. In Cotterman, William and Senn, James (eds.). *System Analysis and Design: A Research Perspective*.
- Kraemer, K.L., Dutton, W.H., and Northrop, A. (1980). *The Management of Information Systems*. New York: Columbia University Press.
- Kraemer, K.L. and King, J.L. (1986). Computerized models in national policymaking. *Operations Research* July-August, 34(4):501-512.

- Kraemer, K. L., King, J. L., Dunkle, D., and Lane, J. P. (1989). *Managing Information Systems: Change and Control in Organizational Computing*. San Francisco: Jossey Bass.
- Lakhanpal, B. (1988). *Determinants of Technological Innovation: Middle Managers and Microcomputers*. Unpublished Ph.D. dissertation. Irvine, CA: University of California.
- Larson, R. C. (1972). *Urban Police Patrol Analysis*. Cambridge, MA: MIT Press.
- Laudon, K. C. (1986). *Dossier society : value choices in the design of national information systems*. New York: Columbia University Press.
- Lawless, M. W. (1982). A policy and process analysis of computer model implementation in criminal justice agencies. In Schults, Randall L. (ed.) *Applications of Management Science, Volume 2*, p. 217-231.
- Lawless, M. W. (1987). Institutionalization of a management science innovation in police departments. *Management Science* February, 33(2),:224-252.
- LEAA. (1969). *First Annual Report of the Law Enforcement Assistance Administration*. Washington, DC: U.S. Government Printing Office.
- Leonard, V. A. (1951). *Police Organization and Management*. New York: The Foundation Press.
- Leonard, V. A. (1980). *The new police technology : impact of the computer and automation on police staff and line performance*. Springfield, Ill.: Thomas, c1980.
UCLA URL HV 7936 A8 L46
- Los Angeles Police Commission. (1991). *Investigation report of the Rodney King incident*. Los Angeles, CA: Los Angeles City Police Commission, 1991.
- McDonnell, R. E. (1982). Information management. In Garmire, Bernard L. (ed.). *Local Government Police Management. Second Edition*. Washington, DC: International City Management Association, p. 310-334.

- Morgan, B.J. (1990). *The Police Function and the Investigation of Crime*. Brookfield, VT: Avebury.
- Ness, J.R. (1991). The Relevance of Basic Law Enforcement Training - Does the Curriculum Prepare Recruits for Police Work: A Survey Study. *Journal of Criminal Justice* 19(2):181-193.
- Northrop, A., Kraemer, K.L., Dunkle, D., and King, J.L. (1990). Payoffs from Computerization: Lessons Over Time. *Public Administration Review* September/October, p. 514.
- Rosenberg, N. (1982). *Inside the Black Box: Technology and Economics*. Cambridge: Cambridge University Press.
- Sproull, L. and Kiesler, S. (1991). *Connections : New Ways of Working in the Networked Organization* . Cambridge, MA: MIT Press.
- Talley, R.A. (1984). A Task Inventory Follow-up Examination of the Oakland Basic Police Academy Curriculum: A Survey Study. Unpublished Doctoral Dissertation. East Lansing, MI: Michigan State University.
- Trautman, N.E. (1986). *Law Enforcement Training*. Springfield, IL: Charles C. Thomas.
- Twentieth Century Fund – Task Force on the Law Enforcement Assistance Administration. (1976). *Law Enforcement: The Federal Role*. New York: McGraw-Hill.
- Vollmer, A. (1930). *Survey of the Police Department: Minneapolis, Minnesota*. Minneapolis, MN: City of Minneapolis.
- Walker, W.E. (1981). *Models in the Policy Process: Past, Present, and Future*. Santa Monica, CA: Rand Corp.
- Weimer, D.L. (1980). *Improving Prosecution: The Inducement and Implementation of Innovations for Prosecution Management*. Westport, CT: Greenwood.

- Weiss, A.R. and Birnbaum, P.H. (1989). Technological infrastructure and the implementation of technological strategies. *Management Science* August, 35(0):1014-1026.
- White, M., Radnor, M., and Jansik, D. (eds). (1975). *Management and Policy Science in American Government: Problems and Prospects*. Lexington, MA: D.C.Heath.
- White, S.O. and Krislov, S. (eds.). (1977). *Understanding Crime: An Evaluation of the National Institute of Law Enforcement and Criminal Justice*. Washington, DC: National Academy of Sciences.
- Wilson, J.Q. (1968). *Varieties of Police Behavior: The Management of Law and Order in Eight Communities*. Cambridge, MA: Harvard University Press.
- Wilson, O.W. (1941). *Distribution of Patrol Force*. Chicago, IL: Public Administration Service.
- Zenk, G.K. (1979). *Project SEARCH: The Struggle for Control of Criminal Informaiton Systems in America*. Westpot, CT: Greenwood Press.