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Combining Police and Probation Information Resources to Reduce Burglary:

Testing a Crime Analysis Problem-Solving Approach[*]

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Abstract

This research report describes the joint effort of the Phoenix Police Department (PPD) and the Maricopa County Adult Probation Department (APD) to develop a shared database for use, with GIS mapping, as a crime analysis tool within a formal problem-solving process to reduce crime. The project as originally designed included three components:

1. Construction of a shared database and integration of selected data from the two departments;

2. Collaboration of the departments in a formal, systematic problem-solving process aimed at reducing regional instances of burglary; and

3. Documentation of the above components and an evaluation of their impact on crime, using a quasi-experimental research design.

Evaluators established a quasi-experimental design to test the central proposition that a database shared by the police and probation departments and used in crime analysis and problem-solving applications would support greater reductions in crime than would reliance solely on single-agency data. Four PPD precincts with roughly equivalent populations and crime levels were to participate. Two precincts would have access to shared data and practice formal problem-solving techniques, and two control precincts would use police data and their normal methodologies. In addition to assessing the shared system's impact on crime, evaluators were to document the construction of the shared database, the integration of data from the two agencies, and the use of new applications by PPD and APD. The project was repeatedly delayed as organizational issues between and within the two agencies emerged and technical problems arose, making fidelity to the original project design impossible.

Despite the project's failings, the project did provide probation and police officers at the two agencies with a shared data pool and GIS mapping capability for crime analysis. At the close of the project, no hard evidence had surfaced that use of the shared database, under the existing circumstances and within the project period, had resulted in measurable reductions in crime.

Executive Summary

In recent years, observers have witnessed a shift in law enforcement from reactive, incident-driven policing to the more proactive crime prevention and reduction approaches embedded in problem-oriented policing and community policing. Problem orientation is the defining characteristic of the newer approaches; police are using research and crime analysis to identify patterns of criminal events or incidents, termed *problems* (Dunworth and Abt Associates Inc.2001). Information gathered as police respond to incidents along with information collected from other sources help to more clearly define the scope, nature, and causes of particular crimes and crime-related problems (Eck and Spelman 1998; Goldstein 1979 and 1990). Crime analysis, especially with advanced Geographic Information Systems (GIS) for crime mapping, can inform problem-solving processes, increasing the effectiveness of crime identification and reduction strategies (Cordner 1997).

Thus far, problem-solving approaches to crime reduction have tended to emphasize the use of police data and police problem-solving processes and activities. Examples can be found of police agencies using non-police data, such as city zoning and licensing databases or community survey data, for analyzing crime problems, but for the most part, crime analysis still relies most heavily on data captured in police databases. Oddly, since probation databases are rich in information useful to police, relatively few instances appear in the literature of local police and probation agencies sharing data, developing common databases, and engaging in collaborative, systematic problem-solving approaches to community

safety and crime reduction.

The persistent finding that a relatively small number of individuals contribute disproportionately to the total number of arrests (Brame and Picquero 1998; Blumstein, Cohen, Roth & Visher 1986; Sherman, Gartin & Buerger,1989) suggests good law enforcement reasons for monitoring the whereabouts of probationers. For police, ready access to a probation database containing the name, residential and work addresses, criminal offense history, personal (age, race, sex) and physical (height, weight, scars, tattoos) data, and similar information on each probationer would seem to be invaluable in the investigative process. For probation departments, access to current police data could enhance their ability to monitor probationers and reduce probationer-related risks to the community. Rapid access to geo-coded police data on arrests and field interrogations with offenders, victims, and witnesses could alert probation officers to recent police contacts with probationers. Such information also would   be useful in preparing officers for encountering emotionally distraught and potentially volatile probationers or family members, increasing officer safety on the job.

The subject of this report is a demonstration project involving the construction and use of a shared database by the Phoenix Police Department (PPD) and the Maricopa County Adult Probation Department (APD). The database was a joint crime-analysis and problem-solving effort aimed at reducing crime in selected areas of Phoenix, Arizona. The project had three major components:

1. Construction of a shared database and integration of selected data from the two departments;

2. Collaboration of the departments in a formal, systematic problem-solving process aimed at reducing regional instances of burglary; and

3. Documentation of the above components and an evaluation of their impact on crime, using a quasi-experimental research design.

As originally conceived, the project was expected to measure the impact of integrating data from the two agencies into a single shared database that (along with advanced crime analysis techniques and problem-solving processes) would be used by both agencies to reduce crime. The principal objective was to test the proposition that using such a system would lead to greater crime reductions than if the agencies continued relying solely on their separate data.

The original evaluation design was simple and straightforward, but it proved impossible to implement. Most of the problems encountered sprang from delays in the development of the shared database. One of the artifacts of a series of long implementation delays, priorities within the two agencies shifted over the life of the project. At the Maricopa County Adult Probation Department, a change in executive leadership affected implementation. Turf issues involving data security and control and other personnel changes factored into the problems encountered, as well. Consequently, the demonstration component of the project was never fully implemented. Most of what has been learned (or relearned) from evaluating this project are lessons to be applied to future similar shared database development projects, rather than lessons about the impact of such systems on crime reduction.

The greater burden for the shared database's development and implementation fell disproportionately on one agency, the Maricopa County Adult Probation Department, while that agency was ill-equipped for the undertaking. As the project began, the Phoenix Police Department was already on an accelerated trajectory for expanding its crime analysis capacity.

Compared with the probation department, PPD had a well-resourced technical staff within its Computer Service Bureau. Existing database systems were relatively stable, whereas in APD, the electronic data management system was less sophisticated and in the midst of transition.

To assess PPD and APD practices and capacities when the project was first launched, evaluators conducted stakeholder interviews and surveyed police patrol officers and probation officers and supervisors. We explored issues pertaining to communication and the potential for data sharing between probation and police officers, identified the use and management of probation data within APD, and examined probation and police officer attitudes toward various information sources. Stakeholder interviews were conducted in 1999; surveys were completed in mid-2000, before the shared database had been implemented and before GIS mapping of the database had occurred. One objective of the project was to increase information sharing and communication between PPD and APD. Stakeholder interviews and officer surveys revealed that plenty of room existed for improving communication and data sharing between the agencies.

The project's development and implementation phase, scheduled for completion within 6 months, consumed most of time allowed for the entire project in the grant agreement. Start-up delays, technological problems, organizational barriers, and shifting organizational priorities hampered progress. By project close, the original plan had not been fully implemented. The expanded time required for database development and other problems finally made it impractical to apply the agencies' new data capacity to formal problem-solving processes, as originally planned. Although never fully developed, the integrated database was used for a variety of other administrative, strategic, and tactical projects.

The final configuration of data differed significantly from what was initially conceived. Among other things, the number of data fields had been reduced to the following elements:

Probation Data
- Name/alias
- Address
- Demographic/Personal Characteristics
    Age
    Gender
    Marital status
    Height and weight
    Hair and eye color
    Scars and tattoos
    Occupation and employer
    Level of probation supervision
    Reason for supervision

Police-Crime Data
- Date of occurrence
- Time of occurrence
- Location of crime
- Type of crime
- Officer ID
- Department Report (DR) number
- Crime code

As a component of the project, the new GIS mapping capability enabled APD to conduct spatial analyses of probationer data in support of several applications. For example, a number of space planning and office expansion projects were facilitated by mapping the distribution of the probation population and GIS helped in redistricting certain caseload areas. APD also conducted analyses of the density of sex offenders by zip codes within County Board of Supervisors, the distribution of probationers and treatment facilities to inform placement of new treatment resources, and the potential overlap of juvenile and adult probationers. Mapping data in the APD database was also used to assist in redrawing jury selection boundaries within court districts.

At PPD, the department's crime analysis unit used the new shared database to respond to specific administrative, strategic, and tactical requests for analyses from police headquarters and personnel in specialized bureaus and the precincts. For example, the unit mapped the density of county probationers in selected police beats, in support of decision-making about patrol

allocation and precinct-level resource allocations. Another mapping analysis depicted the densities of injury and fatal traffic collisions in relation to Driving Under the Influence (DUI) probationers and liquor sales establishments, in support of projecting and planning for traffic patrols. The unit also mapped the density of probationers living near schools within selected precincts and the occurrence of offenses involving either a minor or sexual conduct; this map was used for risk assessment and planning prevention strategies. PPD used the system for "journey to crime" tactical analyses for two difficult investigations.

Despite the problems encountered throughout the project, we noted that both agencies had been tenacious, and the database was eventually developed and used, albeit imperfectly. It continues to be in use and is regularly updated. If there is an overarching lesson to be derived from this experience, it is that data sharing between probation and police agencies is possible and even desirable, but that detailed feasibility analysis and planning should occur *before* any two agencies decide to proceed. The agencies must assure that the data to be integrated from each agency is compatible and of similar (high) quality. Most important, both agencies must have stable leadership committed to the project and the needed human and technical resources to develop, support, maintain, and exploit the opportunities that such databases can provide.

Several lessons emerged from the experience of the Maricopa County Adult Probation and the Phoenix Police Department:

1. *Timing matters.* The single most significant impediment to project completion and success turned out to be time. Both a substantial delay in beginning the work and the extended time needed for completion of even the scaled-down database checked momentum and prevented implementation of the application project components. Many of the innumerable other problems had their origins in the altered project

schedule. One of the preventable factors in the delays: the agencies attempted the project while their IT units were also pressing to prepare for Y2K, making it virtually impossible to give this project adequate priority in its critical early phases. When planning major projects, participating agencies should scan for competing initiatives or events that could disrupt or derail implementation.

2. *Technical reconnaissance and support is critical.* Project planners had under-estimated the depth of the technical issues that would need resolution. In their enthusiasm for the project, neither agency conducted a technical feasibility assessment, nor did they involve technology staff in early planning. Consequently, the impact of certain obstacles (e.g., APD's mediocre data quality) was overlooked or underestimated, particularly by APD, as was the criticality of developmental training and technical support for users.

3. *"Turf" issues must be recognized and resolved early.* Two such issues cost this project time and results, one inter-organizational and one intra-organizational. Between the departments, mistrust of how the agencies might use or misuse the other's information needed to be systematically acknowledged and resolved, at all relevant organizational levels, top to bottom. Also, within the police department, units responsible for developing and operating the shared data system were brought into the project too late and had too little interaction. As a result, each operated with different understandings and motivations. IT was excited about feeding data to a new system for use in patrol cars, while the intended primary users – crime analysts – were still depending on APD for the data. The demonstration purpose of the project was circumvented until this problem was recognized and corrected.

The crime analysis unit's late exposure to and involvement in the project dampened staff enthusiasm and commitment. PPD was undergoing a culture shift. Crime analysis had previously been a small unit with limited capacity; IT staff, who considered themselves the unilateral point of contact for data acquisition and database development, were unaccustomed to supporting crime analysis applications and concepts. IT was dedicated to providing probationer information in real time to officers in the field; to them, applications serving administrative and strategic purposes seemed of secondary importance. Early in the project, focused team-building might have provided the common understanding and motivation among the various players needed to get everyone behind the project goals.

4. *Assess organizational capacity.* Overestimating the organizational capacity of the agency partners, PPD and ADP, to undertake this project undermined its chances of success, especially in achieving the technological components. The scope and scale of technical work far exceeded APD's capacity to deliver. At APD, Y2K preparations already were colliding with a planned conversion to a new probationer database system. For much of the project, APD operated without staff expertise in GIS mapping. An individual employed under the grant to fill that void left the agency before the project was completed. Other APD staff did their best to carry on, but they lacked the specialized expertise and could only support the project as time allowed. In addition, PPD modified the database file structures requiring APD to write new corresponding code. At times, APD simply lacked the ability to respond to the escalating challenges.

For PPD, on the other hand, the project's timing was optimal. The department

had already begun expanding its crime analysis capacity, and it readily acquired the additional expertise needed to support GIS mapping for crime analysis. Before launching similar projects, organizations should assess carefully whether or not the they and the partnering organizations possess the resources and infrastructure to fully support the project over and beyond the life of the project's development and initial implementation.

5. *Continuing education and support are essential.* Educating computer application end users is a continuing process of ensuring familiarity with database structure and data quality, understanding of the system's purpose and potential, and ability to enter, access, manipulate, and report the data. PPD was prepared to deliver training and support to end users, and with a growing crime analysis staff, they were able to respond to requests for customized analyses. PPD's training and support capacity was rapidly institutionalized.

   In contrast, APD's staffing limitations resulted in little training and support for users, once an initial training session had been conducted for a few of them. This, in turn, limited the number of potential individuals who could use the database. Some minimally trained users were unable to continue using the database because they lacked the needed technical support. Organizations contemplating similar projects should build into their plans and budgets adequate continuing education and technical support for users.

6. *Anticipate organizational change.* Some organizational change is inevitable during the life of any 2-year project; not all can be anticipated. A mid-point change in APD leadership had a profound impact when new priorities rewrote the department's

agenda and redirected its resources, some of which had been allocated to this project. Planners of similar projects should consider strategic protections for their resource investments to minimize the impacts of such direction changes. Typical devices such as Memorandums of Understanding are useful for continuity, but anchoring project commitment and support within a broad base of mid-level managers might also ensure project completion when changes at the highest levels of agency administration occur. As a group, mid-level managers provide a stable foundation for worthwhile projects.

7. *Acknowledge and address organizational culture issues.* As Bryson (1995) points out, sometimes even minor changes of practice within organizations require organizational culture changes. The current project, as originally proposed, assumed that joint problem solving would be welcomed (or at least accepted) by staff; that assumption proved faulty. For example, evaluators were initially given to believe that formal problem solving already was being practiced throughout PPD; later, we found that the practice was uneven, and in one of the participating precincts, it was completely absent. Expecting that precinct to use a new technology system to engage in a practice not already part of its value system was unrealistic and further complicated implementation of the problem-solving component in that precinct. Meanwhile, APD had no tradition of formal problem solving, and few APD personnel were eager to embrace the approach, especially since it involved PPD, with whom some had an uneasy relationship. Anticipating barriers posed from within organizational cultures and devising intelligent strategies for razing those barriers would   facilitate the success of similar projects in the future.

1. Combining Police and Probation Information Resources to Reduce Crime

For the past several years, law enforcement has been shifting its emphasis from incident-driven, reactive policing toward community and problem-oriented policing, characterized by proactive crime reduction and prevention approaches. Problem orientation – that is, the use of research and crime analysis to identify patterns of criminal events or incidents, or *problems* – is the defining characteristic of the newer methodologies (Dunworth et al. 2001). To gain a clear understanding of the nature, scope, and causes of particular crimes or crime-related problems, police collect and organize information as they respond to incidents, and they draw additional information from other likely sources (Eck and Spelman 1998; Goldstein 1979; 1990). Once the problem and its contributing factors have been identified and understood, the next steps are to design effective responses to the factors that led up to the crime or disorder, and to look beyond traditional police resources for operational capacity (Moore 1998).

Police agencies across the country and on several other continents have adopted SARA, a systematic problem-solving model (or a recent variant known as the enhanced SARA model). The acronym represents the initials of four progressive action phases: scanning, analysis, response, and assessment. Crime analysis techniques and technologies have become increasingly instrumental in effective problem-solving, particularly with respect to crime identification and reduction strategies (Cordner 1997).

Most of the emphasis on problem-solving approaches to date has been on police, police

data, and processes carried out by police.[*] Geographic Information Systems (GIS) – computer-based systems used to store, manipulate, and report geographic information – are among the most productive technologies applied to problem-solving for crime reduction. As of 1999, nearly half of U.S. law enforcement agencies with 100 or more sworn officers were using GIS computerized crime mapping for general police operations (Mamalian and LaVigne 1999), including everything from identifying patrol beats and patrol deployment (McEwen and Taxman 1995) to identifying hot spots of drug activity (Weisburd and Green 1995), gang activity (Block 1998; Lemmedu need all nameset al. 1998), burglaries (LeBeau and Vincent 1998), and auto thefts (Canter 1998). GIS mapping has been helpful in packaging and presenting crime data and activity trends to neighborhood organizations and other community groups (Taxman and McEwen 1998). GIS mapping and crime analysis also have become important tools in the police accountability movement, for example, in COMPSTAT-like applications (Goldsmith, Langer and Graff 2004).[†]

Police-Probation Departmental Information Sharing

To date, problem-solving approaches to crime reduction have tended to emphasize the use of police data and police problem-solving processes and activities. Although many examples can be found of police agencies using non-police data such as city zoning and licensing databases or community survey data for analysis, relatively few instances are documented of police and probation agencies sharing data, developing common databases, or engaging in collaborative and systematic problem-solving, even though crime reduction and community safety are among the responsibilities of both agencies.

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[*] See Harries (2001) for an exception and an application of mapping to parole and probation (Keith Harries, "Applications of Geographic Analysis in Parole and Probation," National Criminal Justice Reference Service, NCJ Number: 19136).

[†] See the Mapping and Analysis for Public Safety web site for a variety of examples of police-related mapping applications in recent years (www.ojp.usdoj.gov/nij/maps).

This seems an odd oversight, since probation databases are rich in information useful to police. The persistent finding that a relatively small number of individuals contribute disproportionately to total arrest numbers (Brame and Picquero 1998; Blumstein et al. 1986; Sherman et al. 1989) suggests that good law enforcement reasons exist for monitoring the whereabouts of probationers. Probationer databases contain the names, residential and workplace addresses, criminal offense histories, personal (age, race, sex) and physical (height, weight, scars, tattoos) data, and other information about prior offenders still under supervision. Geo-coded and mapped, for example, such data might depict clusters of drug-involved probationers living in close proximity, information that could be used to interrupt drug sales networks. Similarly, such data might produce short lists of burglary suspects among probationers who live, work, or commute in the vicinity of a burglary site and fit other known offender characteristics.

Geo-coded police data would be similarly useful to probation officers, who could monitor police contacts with probationers as names and addresses of offenders, victims, and witnesses are entered into police data systems. Routine checking for probationers' recent law enforcement contacts could alert officers to probation violations or to potentially dangerous situations that could arise in the course of making home visits. For example, a data search while preparing for home visits might reveal a police visit to a probationer's residence for a domestic disturbance, or that the probationer's teenager has been arrested, or that the probationer was questioned in connection with a crime. Such data, if timely and accurate, could increase the efficiency with which officers work and their safety on the job.

Sharing data, developing common databases, and engaging in collaborative problem-solving could be both feasible and mutually beneficial for police and probation departments.

Such partnerships promise to lend coherence and impetus to what often are   fragmented efforts

to apply problem-solving to the tasks of reducing crime and increasing community safety.

Certainly, some barriers stand in the way; concern for internal security and potential

misuse, protecting agency turf, and legal and technological issues are among them. To succeed,

each agency would need confidence that the accuracy and completeness of the other's data

would be consistently reliable. Nevertheless, with foresight and planning, barriers can be

removed, and the benefits of data-sharing to serve the mutual needs of police, probation officers,

and the larger community should be well worth the effort.

Project Goals and Purpose

The subject of this report is a demonstration project involving the construction of a

shared database by the Phoenix Police Department (PPD) and the Maricopa County Adult

Probation Department (APD). The database was a joint crime-analysis and problem-solving

effort aimed at reducing crime in selected areas of Phoenix, Arizona. The project had three major

components:

1. Construction of a shared database and integration of selected data from

   the two departments;

2. Collaboration of the departments in a formal, systematic problem-solving

   process aimed at reducing regional instances of burglary; and

3. Documentation of the above components and an evaluation of their

   impact on crime, using a quasi-experimental research design.

As originally conceived, the project was to show the utility and impact of integrating data

from the two agencies into a single shared database that would be used (along with advanced

crime analysis techniques and problem-solving processes) by both agencies to reduce crime. The

principal objective was to test the proposition that using such a system would lead to greater crime reduction than if the agencies continued relying solely on their separate data.

Earlier, the Phoenix Police Department had engaged in strategic planning that identified burglary as a high priority for their attention. Nearly 20,000 burglaries were being reported annually, but only about six percent of the cases were being cleared. One goal of the Phoenix Policing Plan was "to implement a comprehensive pilot program that will reduce the burglary rate in selected target areas." The reduction effort was slated for two high-crime precincts, Central City and Cactus Park. To achieve the goal, the department and precincts needed to increase their capacity for crime analysis. Two GIS software products, ArcView and CrimeView, were acquired to identify, map, and monitor burglary patterns and trends and to provide address information on burglaries and burglary arrests. During the planning process, police officials noted that real-time access to information on probationers residing in high-crime precincts would be of help.

Maricopa County Adult Probation Department (APD) serves nearly all communities in the Valley of the Sun. In 1999, the agency was supervising more than 37,000 probationers and had been receiving new cases at a rate of about 12,000 each year. Around 65 percent of offenders under supervision resided within the City of Phoenix. Of these, about half had been convicted of property crimes. At the time that the police department proposed sharing data across the departments to help address local burglary problems, APD was in the midst of upgrading its automated databases and developing an automated field book for probation officers, with daily updating of offender information. APD had a research division, but no GIS mapping capacity nor formal problem-solving experience. Some problems would have to be overcome, but APD was also interested in the partnership.

Project Design

The first project component – constructing the shared database and integrating data –

meant that the agencies would have to synchronize their data and data formats. The police

department already managed the Phoenix Automated Computer Entry (PACE) Records

Management System (RMS). This database contained incident reports and field interrogation

files, as well as known offender data. PACE was chosen to be the "parent" system. It would need

to be expanded to accommodate probationer data and daily updates coming from the probation

agency. APD agreed to upload the daily updates, including geo-coded probationer residential

addresses, work addresses, conditions of probation, probationer descriptors, and probation

history, on approximately 24,000 probationers who lived in PPD's jurisdiction. PPD would then

transfer reconfigured data to a Structured Query Language (SQL) server that could be accessed

by both agencies. The original intent was to provide access to the integrated and geo-coded data

to both police precincts, regional probation officers, and police and probation headquarters for

crime and other analyses.

PPD had already began expanding its crime analysis capacity, both in terms of personnel

and technology. It had acquired GIS mapping software and was beginning to develop the

technical expertise to use it. APD, on the other hand, did not have GIS capability. As part of the

project, APD was to receive ArcView and CrimeView, the software used by PPD, and a GIS

analyst to geo-code probationer data, to respond to APD user queries, and to train APD officials

to generate reports and maps. PPD crime analysts were to provide the same support for police

personnel in the study precincts.

The second project component was to be a joint, systematic problem-solving process

aimed at reducing the number of burglaries in two high-crime precincts. Four work groups were

to be organized around problem-solving activities. Two advisory groups would be created,

including precinct command officials and APD probation managers. One group would be assigned to each study precinct to facilitate the problem-solving process. In addition, each of the two precincts would have an operations group including patrol supervisors, community policing officers, probation supervisors, and probation officers. These groups would review crime analysis reports and maps, and plan and carry out specific action steps aimed at reducing burglaries within their jurisdictions. All four work groups would have direct access to mapping and analysis technology through their local precincts or probation offices.

The third project component the documentation of crime-analysis and problem-solving processes and the evaluation of the impact on burglary rates. This component, described in detail in the next section, was intended to compare outcome measures for the two study precincts using shared data for analysis with the same outcome measures for the two control precincts.

2. Evaluation Design

The project's process and outcome evaluations were to document database development activities and compare the outcome measures at two study PPD precincts with outcome measures at two control PPD precincts. PPD designated Central City and Maryvale precincts as study sites, since each was focusing on burglary reduction as a result of a recent strategic plan. Both were high-crime precincts with similar average numbers of annual burglaries, approximately 3,100 for Central City and 3,400 for Maryvale. Cactus Park and South Mountain, with average annual burglaries similar to those of the study precincts (3,200 for Cactus Park and 3,300 for South Mountain) were designated as control precincts. All four had similar levels of resources, ranging from approximately 220 to 240 officers.

Maricopa County Adult Probation Department had nine field offices distributed throughout metropolitan Phoenix. Neither the field offices nor probationers assigned to the offices were organized by precinct, but once probationer data was geo-coded, probationer data could be sorted and grouped by precinct, using residential addresses. This grouping showed that an average of 1,900 probationers were residents of each of the four precincts.

Process Evaluation

We planned to conduct the process evaluation throughout the 6 months scheduled for database development, and to continue over the next 15 months during program implementation. (That plan had to be altered in response to serious delays and problems associated with

developing and implementing the shared database.) One of our objectives was to gauge the extent to which the shared database and crime analysis tools were used, and for what purposes. We also wanted to measure user perceptions of the utility and benefits of the database, crime analysis tools, and problem-solving process.

Elements of the process evaluation included observations of group interactions; interviews of participants, stakeholders, and key technical and management personnel in field offices, precincts, and police and probation headquarters; and surveys of probation and police personnel. We focused on topics related to information access, use, and sharing. Our objective was to describe the use of the database and mapping, the level of effort invested in formal problem-solving, the use of crime analysis strategies by probation staff and by police, and the characteristics of joint police-probation operations. The process evaluation was designed to examine three related hypotheses.

1. If the project (shared database) was properly implemented, there should be an observable increase in the amount and timeliness of information available to probation officers pertaining to probationers' technical violations and criminal activities.

2. There should be an observable increase in the amount and timeliness of information supporting problem-solving available to patrol officers and detectives pertaining to probationers.

3. Patrol officers, detectives, and probation officers should have more frequent contact as they use the shared data.

Impact Evaluation

The project also called for an impact evaluation. This required several before-and-after

measurements on possible outcomes taken at the two study precincts and at the two control precincts. At the study precincts, if the project was successful, we expected to find increases in reported burglaries, burglary clearance rates, related crime clearance rates, probationers arrested for burglary, probationers arrested for related crimes, and probation violations. We also hypothesized that patrol officers and detectives would view themselves as more involved in problem-solving activities, and that probation officers would perceive a greater sense of personal safety when encountering probationers.

Evaluation Design Fidelity

The evaluation design originally proposed was relatively simple and straightforward, but it proved impossible to implement. Delays at various stages of the project and a variety of internal issues complicated and ultimately prevented the completion of the project's demonstration phase. Over time, priorities within the two agencies had shifted, and a change in executive leadership at the probation agency exacerbated this outcome. Internal conflicts regarding data security and control and other changes in agency personnel all adversely affected the project. Consequently, what this project has to offer those considering similar projects lies primarily within the scope of lessons learned about the *process* of developing an interagency data management system, and not its impacts on actual crime reduction efforts in the field.

3. Agencies' Baseline Capacities and Practices

The burden for the shared database's development and implementation fell disproportionately on one agency, the Maricopa County Adult Probation Department, and that agency was ill-equipped for such an undertaking. As the project began, the Phoenix Police Department was already on an accelerated trajectory for expanding its crime analysis capacity. Compared with APD, PPD had a well-resourced technical staff within its Computer Service Bureau. Existing data management systems were relatively stable in PPD, whereas APD's system was in transition. Therefore, in the section that follows we pay greater attention to APD's baseline capacity.

To assess the respective agencies' capacities and practices, we conducted a series of stakeholder interviews and surveyed police patrol officers and probation officers and supervisors. We explored communication and data sharing between probation and police officers, APD's internal data usage and management, and probation and police officers' attitudes toward various information sources. We conducted stakeholder interviews in 1999, and completed surveys in mid-2000, before the shared database was implemented or GIS mapping had occurred.

Interagency Communication and Data Sharing

Interviews with stakeholders in 1999 indicated that the rate of information sharing between APD and PPD was at an all time low, due in part to APD's transition from one database system to another. Under APD's legacy system (Probation Record Information Network, or

PRINET), probation officers had been receiving daily arrest information. When the data sharing project began, APD was transitioning to the Arizona Probation ETS (APETS) system, and their usual data flow had been interrupted. Once APETS was in place, theoretically, probation officers would continue receiving daily arrest information from the legacy system, but it was not clear that probation officers had either the capability or staff support to actually do so.

APETS appeared to provide no systematic mechanism for information exchange on arrests and field interrogations. Too often, the probation officer's first inkling that a probationer had a new arrest came about when that probationer failed to show up for a scheduled meeting or after conviction when the officer received the request for a pre-sentencing report. In fact, the available information was limited regarding all kinds of probationer contact with police. According to one supervisor, police might contact certain probation officers when a probationer was arrested, but not when the probationer had been interrogated in the field. Essentially, no systematic contact protocol existed regarding individuals in the standard probationary caseload.

From the police perspective, officers making a stop in the field, whether it was simply contact, a field interrogation, or an arrest, usually were unable to determine whether or not the individual involved was on probation, and this lack of information was an important underlying motive for developing the shared database.

Direct contact between police and probation officers was generally described as limited and informal. Probation officers might call the police records unit for information, rather than calling specific police officers. When they did contact police officers, the level of cooperation they received depended on such things as which officer had been contacted and the time of day.

Probation officers had the ability to put a "file stop" on the police PACE system. If police encountered a specific probationer, this would cue them to detain that person or to have him

contact his probation officer. However, this interaction was not a formal protocol; instead, it was considered a favor. The potential for such informal working arrangements seemed to correspond to the size of the probation officer's territory. In smaller districts, probation officers worked more closely with police and relied on particular police officers for information. Those with larger areas often did not form close working relationships, and thus did not have access to the informal exchange of information.

Physical proximity of probation district offices and police precincts also affected the informal exchange of information. In one precinct, probation district offices were within a few hundred feet of the precinct building, and precinct supervisors enjoyed easy access to probation officers and information. Stakeholders also noted that joint activities between probation and police officers encouraged the exchange of information, suggesting that such cooperation (i.e., sharing information in databases) was needed and should be supported by both organizations.

Relatively little concern about how appropriate sharing information between the two agencies might be surfaced at either agency, nor did there seem to be an awareness of the potential for conflict arising from different agency roles (law enforcement versus social work). Instead, stakeholders seem to take for granted that information exchanges would promote mutual and beneficial understanding of their respective roles and responsibilities.

Use of Information and GIS Mapping

A principal application anticipated for the shared database was trend and spatial analyses of police and probation data, using GIS. APD stakeholders indicated rarely receiving current trend information; the reports, when generated, were not distributed to line staff. They believed, however, that probation officers would use information generated by GIS mapping if they had access to it. Some probation officers were known to manually plot the residence and work of

probationers and found such information useful. In addition, they believed that GIS data would give officers a more accurate perception of risk levels when dealing with probationers. Indicators of risk and new criminal activity could allow probation officers to do their own investigations and would influence the interventions used with probationers. This support for the proposed shared database and mapping applications was tempered by concern over the accuracy and timeliness of the data.

Police stakeholders (patrol officers and supervisors) indicated that they occasionally were receiving data reports at briefings. Precinct commanders and area managers reported receiving crime trend information regularly. Their ability to get such information directly was just being developed as this project started. These stakeholders looked forward to receiving probation data and conceptualized several uses, both for problem solving and traditional law enforcement.

Survey of Adult Probation Personnel

We surveyed all supervisors and probation officers at three probation offices (Southport, Wells Fargo, and WRC) within the project target and control area to assess access to and management and use of probation data prior to implementation of the shared database and GIS mapping. The survey responses (n=282) provided a detailed accounting of the relevant issues surrounding the use of probationer data, communication with PPD, the need for more data sharing, and officer safety concerns. (A copy of the survey can be found in Appendix A.)

ADP's respondents seemed to hold views similar to those of the participants in the stakeholder interviews. The respondents agreed that as a rule, probation officers had little contact with the Phoenix police. Only about 19 percent of respondents reported meeting often to exchange information with police officers. In fact, the probation officers reported averaging

fewer than two probationer-related contacts a year with police.

The majority who reported some contact with Phoenix police (71.4 percent) characterized those interactions as positive, professional, fair, or helpful; only five percent felt that police officers had been unhelpful or had acted as if they were being inconvenienced. Approximately 10 percent described their contacts with police as infrequent or nonexistent. Not surprisingly, a similar number indicated that they had not received information from nor provided information to police officers. Fewer than half (48.8 percent) believed that free exchange of information was occurring between the departments. Of those who received information from police, almost half stated that the information shared dealt with police contacts and arrests. Other police information received concerned court reports, block watch information, and transportation.

The most frequently cited information type provided to police by probation officers concerned probationer status (27.6 percent). Respondents reported that they also had provided police with information related to probationers' criminal history (14.5 percent), current residence (18.3 percent), and generally "all necessary information."

Supporting findings from our stakeholder interviews, approximately 64 percent of the probation officers surveyed believed that contact with police officers on a more regular basis would be useful. They cited objectives such as promoting teamwork (29.9 percent), developing communication (28.8 percent), receiving more client information (27.2 percent), and getting to know officers better (7.6 percent). Many individuals who did not need regular contact with the police (58.8 percent) believed that information they needed was already available. Others believed that police officers were uninterested in regular contact with probation officers (7.4 percent), or stated that they did not have time to invest in such contacts (11.8 percent).

Few respondents indicated concern about sharing probationer information with police

officers. Of the nine percent that did raise concerns, approximately half thought police might use the information to target specific groups.

Although the majority of survey respondents indicated that probation officers had access to computer-generated client data (82.2 percent), more than one-quarter of them believed that this type of information was rarely or never used for decision-making. A similar number indicated that computer-generated client data *was* used in making decisions to arrest or issue warrants, and for other types of case management decision-making.

Probation officers and supervisors were queried about other sources of client information. Respondents reported that they received information from print files (89 percent), by telephone communication (82.2 percent), and by e-mail (56.2 percent), with the source nearly always being other probation officers. Just over a third (36.7 percent) of those surveyed indicated that they currently used computer files as a source of client information; nearly two-thirds of them agreed that such information was timely. Those who did not agree were asked why they thought the information was not timely; the majority responded that obtaining files was a slow process and/or files were lost in transfer. Only half reported having access to databases with recent client activity data, and only a quarter agreed with the statement, "Reports regarding recent trends, recent Phoenix police arrests, and probationer activity are available to me."

One rationale for developing the shared database had been its potential for increasing probation officer safety. Our survey gathered data on probation officers' safety concerns, including self-reported instances of threats and attacks and the officers' perceptions of risk on the job. A third of all respondents reported having been threatened with physical harm in the field. In addition, almost 25 percent stated that they had been threatened with harm while in their offices. Only five percent reported having been physically attacked in the field, with half of the attacks

taking place within the last two years.

The majority (76.7 percent) reported some concern for personal safety while in the field. When asked to relate specific safety concerns, probation officers who responded (n=207) offered several, including poor radio communication and lack of backup (29 percent), the dangerous working environment (27.1 percent), and fear of unknown events (24.6 percent). This underlying concern regarding safety is significant, given that 41 percent of those surveyed agreed with the statement that "one of the worst things about being a probation officer is that you never know when a probationer might try to hurt you." Forty percent of the officers who reported no safety concerns stated that they were unconcerned because they were cautious in the field. Almost a third relied on good client relationships to enhance their safety, while 10 percent reported that their training had been sufficient to address such concerns.

Regarding the use of information as a response to officer safety concerns, more than half of those surveyed felt that they did not have access to enough advance information regarding potential threats presented by home visits. Asked what type of information would increase the level of field safety, 37 percent indicated that a better knowledge of violent areas would be useful. Thirty-three percent believed that the criminal history of the client would be useful, while 20 percent indicated an interest in safety equipment and training.

Survey of Phoenix Police Personnel

We surveyed a sample of police personnel, primarily patrol officers, from each of the four precincts participating in the project to assess their beliefs and attitudes about access to information and communication with APD officers; 216 usable surveys were returned. (A copy of the survey instrument can be found in Appendix B.

Of the officers responding, 74.8 percent indicated that crime trend reports were timely.

Seventy-two percent indicated that they had access to databases on crime information, and 38.2 percent agreed that the information systems needed to do their jobs were in place[*]; 46 percent disagreed and 15.8 percent were uncertain.

Sixty-eight percent of the respondents indicated that they were able to access crime data, but 19.9 percent disagreed and about 12 percent were uncertain. More than half (56.4 percent) of the respondents indicated that they were unable to access probation information; 15 percent reported that they could and 28.6 percent were uncertain.

Police officer respondents were queried on several items relating to communication and information sharing with APD. Concerns about sharing police information with APD were registered by 8.5 percent of the respondents. The officers were almost evenly divided in their assessments of whether or not information was then freely exchanged between the agencies, with 30 percent agreeing that it was, 33.6 percent disagreeing, and 33.6 percent uncertain.

Nearly three-fourths (73.75) of the respondents thought relations between PPD and APD were friendly; 6.4 percent disagreed and 19.9 percent were uncertain. Asked whether they met frequently with ADP officers to exchange information, 1.4 percent agreed that they did; 92.3 percent disagreed. Nearly six (5.9) percent agreed that a great deal of communication occurred between PPD and APD officers, but 65 percent disagreed and 30.1 percent were uncertain. More than half (54.3 percent) of the police officers agree that PPD and APD cooperated when dealing with probationers; 22.5 percent disagreed and 23.2 percent were uncertain.

The stakeholder interviews and surveys indicated that at the start of the project, communication between APD and PPD was minimal, and information exchanges tended to occur

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[*] The survey asked respondents to Strongly Agree, Agree, Disagree, Strongly Disagree with a series of statements on information access, sharing and communication., or to indicate if they were Uncertain. In this narrative Strongly Agree and Agree are combined to indicate agreement, and Strongly Disagree and Disagree are combined to indicate disagreement. See Appendix B for the exact wording of survey items.

only informally. A transition in APD's information management system was reported to be hampering ADP officers' access to data. These officers expressed concern about personal safety and a desire to have access to more information. They expressed the belief that data sharing with PPD would enhance their ability to perform their job and to maintain safety in the field. Finally, probation officers expressed few concerns about sharing probation data with police.

Exhibit 3.1 Selected Survey Responses: Probation and Police Officers

	Yes/Agree	No/Disagree	Uncertain
Access to Information: Get Info in a timely manner			
Probation officers (n=282)	63.2	36.8	NA
Police officers (n=216)	74.8	25.2	NA
Access to database on activity			
Probation	50.2	49.8	NA
Police	72.0	28.0	NA
Info system is in place to do the job			
Probation	34.1	38.0	16.0
Police	38.2	46.0	15.8
Able to access crime data			
Probation	65.0	18.4	16.0
Police	68.0	19.9	12.1
Able to access probation activity			
Probation	25.0	46.0	28.9
Police	15.0	56.4	28.6
Contact & Communication: Concerns about info sharing			
Probation	9.1	90.9	NA
Police	8.5	91.5	NA
Free info exchange exists			
Probation	48.8	21.7	29.5
Police	29.3	37.1	33.6
Relations are friendly			
Probation	87.9	2.8	9.3
Police	73.7	19.9	6.4
Meet often to exchange info			
Probation	19.5	71.5	17.7
Police	1.4	92.3	6.3
Great deal of communication			
Probation	21.0	71.5	8.9
Police	4.9	65.0	30.1
Cooperate in probationers			
Probation	69.2	13.1	17.7
Police	54.3	22.5	23.2

PPD respondents expressed different views. They were substantially more likely to report having access to information resources and getting that information quickly. Like their APD counterparts, however, the majority did not think that current information systems were adequate. Also like the APD respondents, PPD officers expressed few concerns about sharing information. They indicated that the relations between PPD and APD officers were friendly, although the majority of PPD officers reported infrequent communication with APD.

One of the project goals had been to increase information sharing and communication between PPD and APD. Stakeholder interviews and surveys demonstrated that there was plenty of room to increase interdepartmental access to shared data and to improve communication. Interestingly, the concerns for data security voiced by the project's technical work group did not surface among the officers of either agency as a barrier to the development of the shared database.

4. Shared Database Development

The original shared database project design required Maricopa County Adult Probation Department to provide the Phoenix Police Department with daily updates of probationer data. The police department would then add data elements from their own databases. The resulting integrated data would reside on a Standard Query Language (SQL) server, accessible to authorized staff from both agencies.

A special information technology work group comprised of MIS staff from each department was established to develop the database management system. Few members of the new work group had been involved in designing the original project; essentially, they inherited a set of predetermined specifications that were somewhat uninformed by technical expertise, and were asked to make it work. Almost immediately technical and security problems began to surface, slowing development.

- APD staff were concerned that police might misuse probation data to harass probationers without legal justification or for personal reasons, and that use of the data to guide police operations would result in a high rate of "false positives" – e.g., sweeps that might include large numbers of innocent probationers.

- PPD representatives were concerned about probation officers having access to their "hot files" and data on active investigations and incident reports, and about potential third-party dissemination of crime and crime-related data.

- APD was concerned whether legal requirements surrounding criminal history information prohibited sharing certain information. Arizona had adopted the Criminal

Justice Information Services Security Policy, prohibiting dissemination of criminal histories to non-criminal justice agencies. APD could disseminate post-conviction offender information if the offense and conviction had occurred within Maricopa County; that was public information. However, they were prohibited from disseminating out-of-county or out-of-state non-conviction data.

- The data-sharing project coincided in time with another demanding, higher priority IT project. It officially began during the second quarter of 1999, just when MIS personnel in both agencies were focused on Y2K preparations.

- PPD was justifiably concerned about APD's data quality. Immediately prior to this project, a county audit had revealed that APD's address data were correct for only about 75 percent of active probationers. Many addresses were incomplete or incorrect, compromising the geo-coded mapping products.

- The IT work group was concerned about hardware capacity. The original concept of placing the database on a SQL server for access by both departments was simply not workable. Housing and updating an additional 24,000 files daily threatened to overload the system, already loaded to capacity.

The critical database development phase of the project had a rocky beginning, to say the least.

Initial Database Configuration

The first phase of database development required integrating data elements from four PPD databases and two APD databases. The four PPD databases resided within the Contact File of PPD's record management system, incorporating contact and other data from Field Interrogations, Police Arrests, Police Data Reports, and Police Incident Data. APD data originated from two files: Probationer Files and Cases Files. The combined database were

planned to include the following data elements:

PPD crime location data:
- Date and time
- Crime type (Arizona statutes)
- Address
- Latitude-longitude coordinates
- Police officer identification number
- Area manager (lieutenant in precinct area)
- Name, race, sex, up to five aliases

PPD contact record data:
- Name, race, sex and up to five aliases
- Date and time
- SID (state identification) number
- Address
- Event type (traffic, crime type, field interrogation)
- Subject type (victim, arrested person, suspect)
- Document type and number
- Officer ID and telephone number
- Area manager

PPD incident reports (DRs)

Data elements from Maricopa County Adult Probation Department:
- SID (state identification) number
- Social security number
- Driver's license information
- Physical description; tattoos and scars
- Auto information
- Race, ethnicity, gender
- Beginning and ending dates of probation
- Offense (NCICC or Arizona Records System)
- Weapons
- Home and work addresses
- Work hours
- Probation restrictions
- Probation officer (including work and fax numbers)

Data Integration Issues

The IT team encountered several technical data integration issues:

- Three different geo-bases were in use by various local government agencies, so the IT

    group had a choice to make. Probation data were not yet geo-coded, so APD was

flexible. Police data had been geo-coded, however, so PPD preferred using their own geo-base. PPD prevailed for reasons of expediency, although the consensus was that a third choice, the fire department's geo-base, was the most current and accurate.

- A procedure was needed to match records across the databases, to consolidate data on individual probationers and to prevent duplicate records. APD and PPD used different procedures for address verification, so that element would not be usable for matching. Different spellings and versions of individuals' names and different aliases for the same individuals further complicated the task. Eventually, the team decided to use two elements for matching records: state identification numbers and dates of birth.

- Initially, questions arose about whether APD could actually connect to PPD's data servers.

- A decision needed to be made regarding the protocol of choice for data transfer; FTP, or File Transfer Protocol, was eventually chosen.

Database Implementation Issues

The original plan called for a 6-month development period, from January 1 to June 31, 1999. In addition to the delays already mentioned, there were others. APD was in transition from a legacy data system to a new statewide system, and programmers and staff were anticipating changes in data accessibility. The procurement process for APD's subcontract for management of their database and GIS mapping development took several more months than expected. Geo-coding the APD data proved to be a major challenge, complicated by the large quantity of incomplete address data. No quality control had been put into place to ensure the accuracy of probationer arrest data entries. Finally, the sheer numbers of erroneous and incomplete addresses affected the shared database's utility.

The technical work group steadily chipped away at these problems, but by July 2000, 18 months into the project, the database still was not fully functional. By mid-July, APD had extracted all probationer data available from its database and had supplied PPD with two updates. Meanwhile, APD had received two updated 30-day police incident data files for loading into its crime-mapping applications. APD had only one of two planned workstations operational at this time, however, while PPD had the capacity for building analysis and crime mapping installed in each of its six precincts. PPD had also trained more than 200 officers to use the mapping software.

By this time, development and implementation was progressing, but several challenges to full implementation remained. PPD identified numerous blocks of APD data that still needed quality control measures applied. Both APD and PPD identified problems on their respective systems with state identification numbers (SIDs), slowing the matching process. For the remainder of 2000, the technical workgroup continued to address matching issues to earn the officers' confidence about data accuracy.

Technical obstacles further complicated the effort. APD's transition from PRINET to APETS (July 2000) involved moving from a legacy system to an Informix database. APD's existing GIS system had to be modified to work with the new system, and custom scripts driving the program had to be rewritten. In addition, APD was placing higher demands on the new data system than it had on the old one. The original interdepartmental agreement called for updated records to be sent to PPD each time APD made significant modifications. With increased usage, the number of records being sent to PPD also increased. The PPD system soon was receiving more records than it could handle. The departments reevaluated the agreed-upon conventions, and APD revised its process by adding SQL tables to the system. This enabled APD to check

modified probationer records against a base file for specific changes and send only those records with changes to PPD. Also, the criteria defining a record as "modified" was changed, reducing the number of records being sent to PPD. Although these changes addressed PPD's concerns, they required APD to further adjust their GIS system.

A data entry protocol problem was less easily resolved, and it actually strained the relationship between the two organizations. APD had not been requiring street suffixes in their database address fields; PPD did. For example, probation officers might enter "123 E Main" as a valid address, while the PPD database would require "123 E Main St." The result was a low geo-coding rate and erroneous results from APD data when it was needed by PPD's GIS system. APD made an effort to retrain officers and audited this data element monthly; PPD adjusted a setting in the geo-code process to include zip codes in the analysis of a address. With these adjustments, PPD was able to derive significantly more usable information from the probationer data for their own analysis and mapping applications.

The system continued to be hampered by a lack of quality control for APD data. Initially, no one at APD had responsibility for data integrity. Probationer data continued to be missing, incomplete, or just wrong, in large part because the newer APETS system had no validation rules in its data fields. Probation officers could enter and the system would accept even obviously incorrect data such as a future date as a probationer's date of birth, or a blank field for the charge for which an individual had been placed on probation. The GIS system, relying on aggregated data, brought to light the extent of APD's data corruption. PPD was vocal about its concern since the efficacy of the entire GIS system depended on data quality.

Years of inattention could not be corrected overnight. As a short-term measure, APD placed data quality controls in its data extract program. As a result, if the program identified data

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in the probationer record that did not pass set validity tests, the record would not be written or sent to PPD. Several validation rules were created, addressing data concerns as they arose. This did nothing to clean the data, but it prevented bad records from being forwarded to the shared system. That system then contained cleaner data, but fewer probationer cases that PPD could query, resulting in a perfectly reasonable lack of confidence that all probationer cases were represented in the database.

Organizational Challenges

The project was further affected by organizational changes that occurred within the Maricopa County Adult Probation Department over the course of the grant project. A new Chief Probation Officer, hired in November 2001, brought to APD a new set of priorities which did not include the shared database project, already underway. Subsequently, fewer resources were allocated for the project's completion. In contrast, PPD's leadership remained stable; resources supporting improved information systems increased throughout the life of the project.

Approximately one year into the project, the GIS analyst who had developed APD's system left the department. The position was never refilled, although no one left in the department had a working knowledge of the software or the ability to write code for ArcView. A consultant was hired to work with APD intermittently as difficulties arose.

Two vital project objectives were to train officers in GIS mapping and to provide the officers with technical support. With diminishing executive support at APD and with restricted resources, limited training occurred for only 36 individuals; the one qualified trainer had been reassigned to other priorities. Novice users of the complex ArcView and CrimeView programs had only one part-time technical support person to help them. PPD, on the other hand, launched a comprehensive training program for the life of the project; the training was revised and

institutionalized in PPD and technical support for end users was readily available.

A certain amount of insularity internal to PPD created yet another impediment. For the majority of the project period, the crime analysis unit was not represented on the technical working group. At the time, information services tended to view the project as an IT database and communications project. IT lacked interest in the crime analysis and mapping applications, not to mention joint problem-solving with APD. Instead, they were focused narrowly on a tactical application, to make probationer data available to patrol officers via Mobile Data Terminals (MDTs) in patrol cars. Even after probationer data became available to PPD, for much of the project, the crime analysis unit had to access that data from APD. Nearing the end of the project, representatives from the crime analysis unit met with the technical working group, after which the barriers between them became less formidable.

Final Configuration and Status of the Shared Database

For several of the reasons discussed above, the final configuration of the shared data system differed significantly from what had been planned. Fewer data elements were included:

Probation Data:
- Name/alias
- Address
- Demographic/personal characteristics
  - Age
  - Gender
  - Marital status
  - Height and weight
  - Hair and eye color
  - Scars and tattoos
  - Occupation and employer
  - Level of probation supervision
  - Reason for supervision

Police Crime Data:
- Date of occurrence
- Time of occurrence
- Location of crime

- Type of crime
- Officer ID
- Department Report (DR) number
- Crime code

Once implemented, the data exchange, albeit inconsistent at times, continued beyond the project's end in 2002. Probationer information was updated approximately twice per month, although the goal remained to update it weekly, and the updated data were accessible to both APD and PPD users. Updated PPD data were sent to APD more sporadically, sometimes every few weeks; other times, every few months. The hardware and software remain in the two target offices for field officers to use; however, without support or further training, usage can be expected to decline.

5. Shared Database Applications and Outcomes

The original data-sharing project was only partially completed, largely due to delays in developing and launching the shared database. Still, both APD and PPD have used the database for numerous projects since completion. In particular, GIS mapping has enabled spatial analyses of probationer data, supporting several management and administrative functions.

System Usage by the Maricopa County Adult Probation Department (APD)

The Adult Probation Department frequently uses GIS analysis to map distribution of probationers as it plans space and office expansions. Similar analyses within units have supported redistricting of caseload areas. APD has also used the system to determine overlap of juvenile and adult probationers, density of sex offenders by zip code within the County Board of Supervisors, and distribution of probationers and treatment facilities to guide placement of new resources. GIS mapping assisted in redrawing jury selection boundaries within court districts.

APD provided evaluators with several examples of GIS maps that were used in actual applications (Appendix C). The first ten maps (Exhibits C-1 through C-10) depict distributions of probationer residences and crime incidents for target and control precincts. Exhibit C-11 represents the same areas with data pertaining only to thefts and burglaries and the residences of probationers convicted of theft and burglary. Exhibit C-12 represents an analytical approach to problem-solving, providing "travel lines" that connect the locations of each probationer's residence with place of work, for those convicted of burglary or theft. The exhibit also illustrates travel lines for probationers living and/or working outside the target area, but whose travel lines

cross into the target area at any point.

APD applied the database and GIS mapping creatively in support of administrative planning and decision-making. For example, Exhibit C-13 (Appendix C) depicts "radio dead zones"; this map helped with planning for improved radio communications. Exhibit C-14 helped analyze individual probationers' proximity to bus routes that serve treatment facilities, helping to identify potential barriers to treatment. Exhibit C-15 depicts the co-location of probationers, treatment centers, and schools, helping to assess risks associated with probationers traveling to and from treatment, when their routes approach schools. Exhibit C-16 depicts distribution of gangs and gang members in Mesa, Arizona, relative to an APD gang intervention project.

GIS's ability to query data geographically and by data element is heavily used, with and without the mapping feature. For example, the warrants unit uses the system internally to assist in sweeping absconders in specific neighborhoods. The Glendale Police Department has used the system's geographic capability to investigate car thefts occurring near probationer addresses.

System Usage by the Phoenix Police Department (PPD)

When the larger project began, PPD had already begun launching an expansion of its crime analysis capacity. The project included mapping and data analysis at each of six police precincts and training for precinct-level users. Our early, informal observations of PPD's expansion indicated that the system's use for crime analysis was uneven across precincts. Usage appeared to be dependent on human factors – that is, on whether or not the precinct already had officers or staff who were technology innovators with an innate interest in using the mapping and analysis software. Later in the project, the department assigned research analysts to precincts, and use of the tools across precincts became more consistent. The central crime analysis unit accounted for much of the system's usage, as unit staff responded to requests initiated from

police headquarters or from the precincts and specialized bureaus. Those requests were most often for administrative, strategic, and tactical crime analysis.

Appendix D is a collection of examples of the department's mapping applications. Exhibit D-17 maps the density of county probationers in selected police beats, a map that supported administrative decision-making regarding patrol allocation and precinct-level resource allocation. Two other maps in Appendix D illustrate strategic database applications. Exhibit D-18 depicts the densities of injury and fatal traffic collisions in relation to Driving Under the Influence (DUI) probationers and liquor sales establishments, an analysis that supported projecting and planning for traffic patrol. Exhibit D-19 maps the density of probationers living near schools within selected precincts and the occurrence of offenses involving either a minor or sexual conduct; this map was used for risk assessment and planning prevention strategies.

Other maps and related documentation in Appendix D illustrate PPD's use of the database for tactical purposes. Exhibit D-**20** is a "journey to crime" analysis, an attempt to crack the so-called Rock Bandit burglaries. The Rock Bandit is an infamous burglar (or burglars) who steals jewelry with precious gemstones from upscale homes in and around Phoenix. The map locates victims' residences in relationship to burglary probationers living in the nearby area. Figure D-**21**is another "journey to crime" analysis, this time for the Tattoo Robberies, a series of robberies of Mexican fast-food restaurants by a heavily tattooed offender.

Problem-solving with the Shared Database

The original project design called for teams comprised of police and probation officers to use the database and GIS mapping for problem-solving. The teams were expected to use a formal process such as the SARA model. Little problem solving of this type actually took place. One inhibitor was the prolonging of database development and a corresponding high rate of member

turnover on the problem-solving teams. Routine reassignment of police officers in the study precincts, their supervisors, and, in some cases, even commanders resulted in a lack of continuity that sapped the team's original commitment. In addition, the database was put into use while still missing many probationer addresses, dampening the enthusiasm of precinct level officers who needed and expected it to identify specific probationers for tactical purposes. All too frequently, their queries turned up missing addresses instead of useful data, discouraging even those who initially had been optimistic about the database's potential for aiding in crime control.

Our informal observations suggested that the level of commitment to underlying formal problem-solving as a policing tool was uneven across precincts, depending on the presence or absence of a champion of the process among supervisors or other precinct leaders. One study precinct had the advantage of an area manager well-trained in problem solving, who had trained and encouraged his officers to undertake problem-solving projects. In study precincts without such champions, officers were usually inexperienced and disinterested in formal problem-solving; thus, the database was not viewed as an asset for that particular purpose.

Appendix E contains maps (Figures D-22 through D-24) constructed during one precinct's attempt at using problem-solving to address its high auto theft rate. Mapping provided an analysis of stolen vehicle "hot spots" and their proximity to auto theft probationers. During evaluation, we noted that officers in this project phase tended to use the new tools to identify specific probationers, but not for serious analysis of the overall problem. As a result, problem-solving in this precinct remained more similar to traditional police work, where the goal is to identify suspects and make arrests rather than to analyze crime patterns in order to craft appropriate responses to the problem. (Probation officers were typically not involved in these problem-solving efforts.)

Adult Probation Department Perceptions

Mid-year in 2002, evaluators distributed a survey to APD officers and supervisors who had participated in GIS training in Spring 2001. The survey examined the trainees' experiences and beliefs about the value of the mapping system and their subsequent use of it. At the time of the survey, seven of 36 trainees were no longer employed by APD; of the remaining 29 officers, 19 completed the survey. The majority of respondents were either probation officers or surveillance officers, with only two self-identifying as supervisors. Approximately one-third of the respondents had been employed by APD for fewer than three years; another third had been employed between three and seven years, and the final third for eight or more years.

Fewer than a third of the respondents (31.6 percent) had had any knowledge of the use or capabilities of the GIS system prior to training; however, many noted their reasons for volunteering for it, reflecting explicit expectations. In general, participants thought that learning to use mapping software "sounded interesting." They indicated interest in applying the software to supervising strategies and to better caseload management. Respondents noted several expectations of training; more than half (57.9 percent) simply expected to learn how to use the software. Others were more specific, stating that they expected to learn what types of crime occurred near clients' residences (10.5 percent), how to track probationers (10.5 percent), and how to map crime patterns (5.3 percent). A few reported no expectations (10.5 percent).

After completing one 3-hour GIS training session, most respondents (84.2 percent) believed that the software could be useful in their work; however, 36.9 percent did not believe that the single session prepared them to use it. Asked what else they needed, participants requested longer sessions, more one-on-one interaction with training staff, post-training technical support, and additional training on printing options. When asked, 63.2 percent indicated a desire for a second session. Asked what should be included in that session, respondents suggested using

scenarios and problem-solving activities, updating trainees on any changes in the data system, and just providing more training in general. Interestingly, one individual stated that a second training session would not be useful unless police and probation departments participated in a joint training session.

Evaluators asked respondents whether they had used or attempted to use the crime-mapping software within the year after training. Slightly more than half (52.6 percent) responded that they had, and specified its uses: mapping "hot spots," locating probationers within specific areas, producing maps (unspecified), locating clients who lived in high-crime areas, practicing their new skills, and demonstrating the software. Of 10 individuals who used the software, seven found it useful, but eight had encountered problems with its use.

Approximately 47 percent of the respondents had not used the software. Asked why not, they responded with the following reasons: their caseloads were not yet in the database; the data were unreliable; they never received passwords; they forgot how to use it; they were too busy; no computer was accessible; or they had been transferred from the unit before they could use it.

One indicator of technology usage is the extent to which participants seek support. One year after being trained, one-third of the respondents reported having requested additional information or training, and all but one received it. We asked the other two-thirds why they had not requested further assistance. Of those who responded, one individual said the relevant caseload was missing from the system; three stated that they were too busy; two stated that they had little computer access; one felt that the system was not useful for the department's work; two stated that they had no need for further help because they understood the software; and one individual had been transferred from the unit.

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Exhibit 5.1 Survey Results for GIS Trainees (APD)

	Agree/Strongly Agree	Uncertain	Disagree/Strongly Disagree
Software is user-friendly	10	6	2
Software is a useful tool	14	4	0
Training provided what I need to know	13	2	3
Support service for using the software are available	4	12	1
Police and probation data for using the software are complete and current	0	7	10
Computers/workstations are available to use the software	8	2	7
With improvements, the software can provide the kind of information I need on my job	13	3	0

In sum, few APD personnel completed GIS system training, and even fewer responded to the survey assessing the training. The survey findings suggested a number of problems associated with the introduction of the new technology. First, the organizations may not have adequately considered their employees' existing technical and/or computer aptitude, knowledge, and experience when planning the training session. More than half of the respondents reported no prior experience with any type of specialized software. This became apparent in the significant number of probation officers and supervisors who expressed a need for longer sessions, more one-on-one interactions with training staff, and post-training technical assistance. Familiarity with more complex computer software programs is not essential in order to master GIS software, but experience with specialized software may promote greater acceptance and use. In the absence of experience, adequate training and post-training support are needed to make the best use of the technology.

Only half of the trained respondents actually went on to use the software. Most of them found the GIS system helpful and understood its potential; yet the majority encountered problems in its use. Lack of support was not the only obstacle; respondents noted several reasons for not using the software, including lack of access to computer terminals, the unreliability of the

data in the system, and the absence of particular data that was expected to be there.

Overall, most respondents expressed support for the system and for the training, but effective adoption of the system would require further training and technical support, as well as organizational commitment and resources to improve system access. Data reliability and completeness also would have to be improved.

Phoenix Police Department Perceptions

As this project began, an expansion of PPD's information systems was already underway, especially in the area of crime analysis. GIS mapping software and PPD crime data were available in all precincts, and more than 200 officers and staff had been trained to find and use it. A survey of patrol officers and detectives conducted in 2002 provided insight into PPD perceptions of the system's utility nearly two years after this expansion began.

Patrol officers were asked to rate the effectiveness of two types of electronic information, crime analysis data and computer crime maps. Exhibit 5.2 summarizes their responses. A substantial percentage of individuals in both personnel categories rated each information type as "effective" or "very effective" in supporting their work. Detectives tended to give higher ratings than patrol officers to crime analysis data, but both groups rated crime maps about equally. Interestingly, nearly one-third of each group registered no opinion on either information source, which may be an indicator of familiarity with the source, or perhaps of whether or not the respondent had ever used the source. Nonetheless, over the course of the project, the expansion of crime analysis including crime mapping was apparently widely perceived to be a useful tool in support of both patrol and investigations.

Exhibit 5.2 Perceptions of Information Effectiveness (PPD)

	Patrol Officers (n=131)	Detectives (n=58)
Crime Analysis Information:		
Very Ineffective	9.3	6.9
Ineffective	11.6	12.1
No opinion	34.9	29.3
Effective	31.1	34.5
Very Effective	3.1	17.2
Computer Crime Maps:		
Very Ineffective	9.4	12.1
Ineffective	14.1	15.5
No Opinion	37.5	31.0
Effective	36.7	36.2
Very Effective	2.3	5.2

Changes in Crime Patterns

The original project included an impact evaluation component using a quasi-experimental design to determine whether using the shared database for crime analysis and mapping applications could inform problem-solving processes aimed at crime reduction, especially burglary. Implementation problems, including the length of time needed for system development and the persistent data quality deficits, made it impossible to follow the original design. Consequently, we cannot attribute changes in crime trends in target or control precincts to specific problem-solving applications or to the shared database. The impact evaluation's focus on reducing burglary incidents was further sidetracked when PPD implemented a burglary reduction effort unrelated to the shared-database project. Still, crime trends in the four project precincts over the life of the project are of interest.

Exhibit 5.3 illustrates the trend in property crime from 1998 through 2001, showing increases in one target precinct (Maryvale) and one control precinct (Cactus Park), and declines or relatively stability in one target precinct (Central City) and one control precinct (South

Mountain). Although the target precincts had equal access to the shared database and crime analysis and mapping software, we observed differences in their respective commitments to the problem-solving process. Central City placed a great deal of emphasis on using the SARA problem-solving model, whereas Maryvale exhibited little evidence of problem-solving commitment and experience. In addition, midway through the project, commanders rotated assignments. The new South Mountain precinct commander valued problem analysis and data-driven decision-making, and was aggressive about receiving customized crime analysis reports for his precinct, including some using the shared police-probation database. Differences between the precincts' crime trends corresponded with differences in their respective use or non-use of problem-solving techniques, data, and analysis.

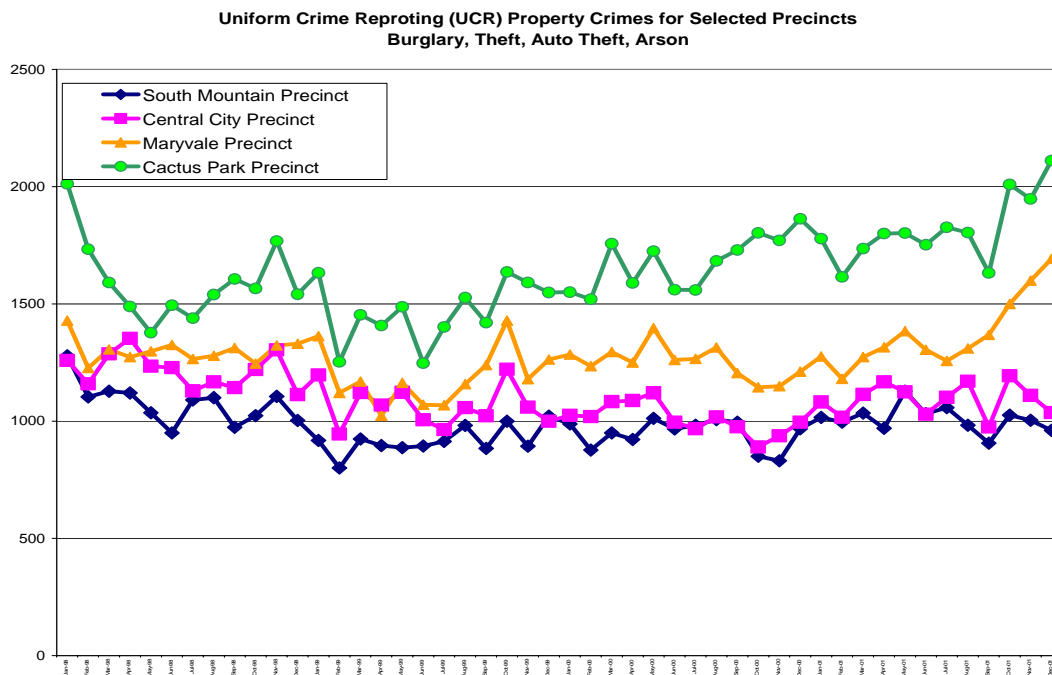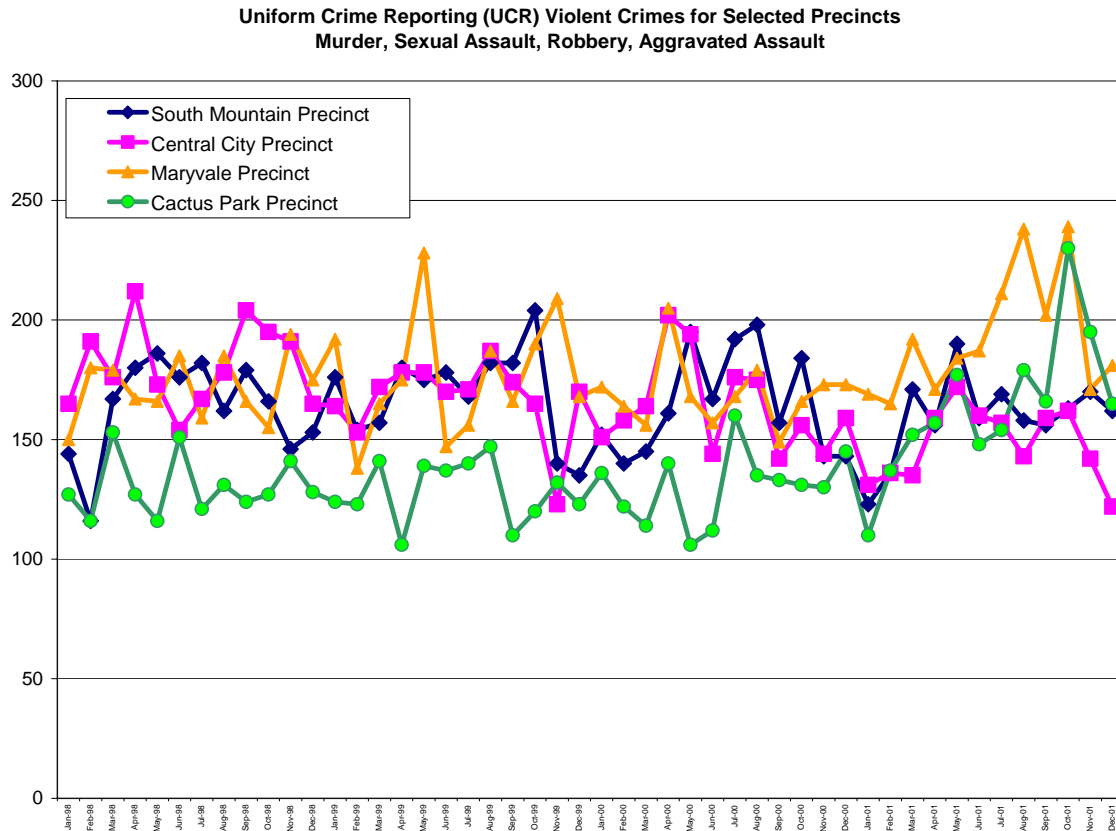**Exhibit 5.3   Property Crime Trend Lines (PPD Precincts, 1998-2001)**

Exhibit 5.4 depicts similar differences for violent crime. Central City precinct exhibits a decrease in violent crime, whereas South Mountain's pattern, although erratic, appears not to increase and may even indicate a slight decline.

Exhibit 5.4 Trend Lines for Violent Crimes

Uniform Crime Reporting (UCR) Violent Crimes for Selected Precincts
Murder, Sexual Assault, Robbery, Aggravated Assault

Overall, we found that despite serious implementation problems that thwarted the
full intent of the original project intent, the agencies have been able to apply the shared database
and the GIS mapping system to support numerous administrative and management functions.

6. Conclusions and Lessons Learned

The present project was originally intended to evaluate the utility of an innovative data-sharing venture by police and probation officers in helping to reduce crime. What began as a project with a relatively tight, quasi-experimental research design turned into a documentary about the uphill battle waged by the two agencies to bring the project to life. In fact, the original project never was fully implemented, although some components did materialize and have been put to good use. Several lessons can be learned from the experience.

1. *Timing matters.* The single most significant impediment to project completion and success turned out to be time. Both a substantial delay in beginning the work and the extended time needed for completion of even the scaled-down database checked momentum and prevented implementation of the application project components. Many of the innumerable other problems had their origins in the altered project schedule. One of the preventable factors in the delays: the agencies attempted the project while their IT units were also pressing to prepare for Y2K, making it virtually impossible to give this project adequate priority in its critical early phases. When planning major projects, participating agencies should scan for competing initiatives or events that could disrupt or derail implementation.

2. *Technical reconnaissance and support is critical.* Project planners had under-estimated the depth of the technical issues that would need resolution. In their enthusiasm for the project, neither agency conducted a technical feasibility

assessment, nor did they involve technology staff in early planning. Consequently, the impact of certain obstacles (e.g., APD's mediocre data quality) was overlooked or underestimated, particularly by APD, as was the criticality of developmental training and technical support for users.

3. *"Turf" issues must be recognized and resolved early.* Two such issues cost this project time and results, one inter-organizational and one intra-organizational. Between the departments, mistrust of how the agencies might use or misuse the other's information needed to be systematically acknowledged and resolved, at all relevant organizational levels, top to bottom. Also, within the police department, units responsible for developing and operating the shared data system were brought into the project too late and had too little interaction. As a result, each operated with different understandings and motivations. IT was excited about feeding data to a new system for use in patrol cars, while the intended primary users – crime analysts – was still depending on APD for the data. The demonstration purpose of the project was circumvented until this problem was recognized and corrected.

    The crime analysis unit's late exposure to and involvement in the project dampened staff enthusiasm and commitment. PPD was undergoing a culture shift. Crime analysis had previously been a small unit with limited capacity; IT staff, who considered themselves the unilateral point of contact for data acquisition and database development, were unaccustomed to supporting crime analysis applications and concepts. IT was dedicated to providing probationer information in real time to officers in the field; to them, applications serving administrative and strategic purposes seemed of secondary importance. Early in the project, focused team-

building might have provided the common understanding and motivation among the various players needed to get everyone behind the project goals.

4. *Assess organizational capacity.* Overestimating the organizational capacity of the agency partners, PPD and ADP, to undertake this project undermined its chances of success, especially in achieving the technological components. The scope and scale of technical work far exceeded APD's capacity to deliver. At APD, Y2K preparations already were colliding with a planned conversion to a new probationer database system. For much of the project, APD operated without staff expertise in GIS mapping. An individual employed under the grant to fill that void left the agency before the project was completed. Other APD staff did their best to carry on, but they lacked the specialized expertise and could only support the project as time allowed. In addition, PPD modified the database file structures requiring APD to write new corresponding code. At times, APD simply lacked the ability to respond to the escalating challenges.

For PPD, on the other hand, the project's timing was optimal. The department had already begun expanding its crime analysis capacity, and it readily acquired the additional expertise needed to support GIS mapping for crime analysis. Before launching similar projects, organizations should assess carefully whether or not the they and the partnering organizations possess the resources and infrastructure to fully support the project over and beyond the life of the project's development and initial implementation.

5. *Continuing education and support are essential.* Educating computer application end users is a continuing process of ensuring familiarity with database structure and data

quality, understanding of the system's purpose and potential, and ability to enter, access, manipulate, and report the data. PPD was prepared to deliver training and support to end users, and with a growing crime analysis staff, they were able to respond to requests for customized analyses. PPD's training and support capacity was rapidly institutionalized.

In contrast, APD's staffing limitations resulted in little training and support for users, once an initial training session had been conducted for a few of them. This, in turn, limited the number of potential individuals who could use the database. Some minimally trained users were unable to continue using the database because they lacked the needed technical support. Organizations contemplating similar projects should build into their plans and budgets adequate continuing education and technical support for users.

6. *Anticipate organizational change.* Some organizational change is inevitable during the life of any 2-year project; not all can be anticipated. A mid-point change in APD leadership had a profound impact when new priorities rewrote the department's agenda and redirected its resources, some of which had been allocated to this project. Planners of similar projects should consider strategic protections for their resource investments to minimize the impacts of such direction changes. Typical devices such as Memorandums of Understanding are useful for continuity, but anchoring project commitment and support within a broad base of mid-level managers might also ensure project completion when changes at the highest levels of agency administration occur. As a group, mid-level managers provide a stable foundation for worthwhile projects.

7. *Acknowledge and address organizational culture issues.* As Bryson (1995) points out, sometimes even minor changes of practice within organizations require organizational culture changes. The current project, as originally proposed, assumed that joint problem solving would be welcomed (or at least accepted) by staff; that assumption proved faulty. For example, evaluators were initially given to believe that formal problem solving was already being practiced throughout PPD; later, we found that the practice was uneven, and in one of the participating precincts, it was completely absent. Expecting that precinct to use a new technology system to engage in a practice not already part of its value system was unrealistic and further complicated implementation of the problem-solving component in that precinct. Meanwhile, APD had no tradition of formal problem solving, and few APD personnel were eager to embrace the approach, especially since it involved PPD, with whom some had an uneasy relationship. Anticipating barriers posed from within organizational cultures and devising intelligent strategies for razing those barriers would be facilitate the success of similar projects in the future.

In retrospect, the above observations may appear obvious. However, this kind of technology project was new to the two agencies involved. In spite of the problems encountered throughout the project, we applaud both agencies' tenacity. The database, albeit imperfect, was developed and put to good use; it continues to exist, to be updated regularly, and to be used to the best ability of each agency.

If there is a single overarching lesson to be learned from the experience of these two agencies, it is that data sharing can be successfully accomplished, but a scrupulous and broad feasibility study should be conducted before committing, in order to identify systematic

weaknesses that could sink the effort, if they are not addressed in advance. For example, in this case, it would have been useful to know that APD's data quality would be problematic, and that the human and technical resources were inadequate at the agency to develop, support, maintain, and exploit opportunities that the shared database could provide. Identifying such weaknesses early in the process would have allowed the agencies to correct the problem before embarking on database construction, or if the weaknesses could not be corrected, to revise or drop the project before it diverted resources. A related lesson relearned -- leadership in all partnering agencies must believe in and be committed to the use of such databases, or the resources will not materialize for them to overcome challenges and achieve their goals.

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Appendix A. Probation Surveys

Appendix B. Police Surveys

Appendix C. Probation Applications

Appendix D. Police Applications