Understanding the Nature of Police Information Systems in Maine: Technological Implications

Prepared by: Wayne T. Cronin
Muskie School of Public Service
Portland, Maine
Faculty Advisor: Professor Dahlia Lynn, Ph.D.

Table of Contents

Executive Summary

This research provides an overview of the challenges facing Maine's municipal police departments when implementing police information systems. Previous research on this topic has focused mostly on the experiences of large metropolitan police departments whose resource base is likely to be much larger than the average police agency in Maine. The purpose of this study is to determine how police departments in Maine are using limited personnel and financial resources to implement police information systems and to suggest potential remedies where challenges exist in those areas.

This research project involved a review of literature, a survey of police information system managers, and personal interviews. The centerpiece of this research is the survey completed by representatives from 47 of the 131 municipal law enforcement agencies in Maine. In that survey, information system managers were asked a variety of questions about budgets, personnel, implementation challenges, and project outcomes.

Funding issues and technology expertise were identified as the two most prominent challenges in police information system implementation. Funding challenges were identified in obtaining up-front costs as well as obtaining money for the cost of system upgrades and ongoing maintenance costs. Developing technological expertise was described as a challenge and a key factor in the successful implementation of a police information system.

The following recommendations address affordability and technical challenges facing municipal police agencies:

- Engage in Strategic Planning for Police Information Systems
- Continue Development of a Strategic Justice Architecture for Maine
- Increase Collaboration and Consolidation
- Develop New Training Opportunities In Police Information Systems

Strategic planning can help police departments avoid costly mistakes during information system implementation and maintenance. Strategic planning can also be beneficial in terms of promoting information sharing and interoperability with other police information systems around the state. The state-led effort to develop a strategic architecture for criminal justice information systems will help avoid multiple proprietary interfaces and will promote information sharing between police, courts, and corrections. The strategic approach to information system development facilitates standardization and opportunities to leverage purchasing power for hardware and software solutions. In addition, there may be opportunities to leverage additional resources by collaborating with state or other municipal public safety organizations. Opportunities exist to develop new ways of providing police information system training to those who need it. Low cost options include in-service training or continuing education courses focused on technical aspects of information system implementation and other challenges identified during the course of this research.

1. Introduction

1.1 Background

Law enforcement agencies across the country are adopting new technology at a rapid pace. According to market research firm Compass Intelligence, in 2008, "the U.S. public safety market (including fire, police, and EMT departments) is expected to spend roughly $17.4 billion on information technology including telecom, applications, outsourcing, services/support, network hardware, computer hardware, and IT personnel" (Compass, 2008). The police segment represents about 74 percent of the public safety market IT spending according to their research.

Public safety technology takes many forms. Technology can be found on the officer's duty belt in portable radio's, smart phones, and in weaponry. In the patrol car, you might find high-tech signaling devices, multi-channel two-way radios, audio/video recorders, digital cameras, and a laptop computer or mobile data terminal (MDT). At police headquarters, you are likely to find computers capable of interfacing with local file servers, records management systems (RMS), Computer Aided Dispatch (CAD) systems, and external computer resources at state and federal law enforcement agencies. There may also be computer systems which are used to archive video footage from closed circuit camera (CCTV) systems, to analyze a variety of forensic evidence, and to provide redundant communications capabilities should primary systems fail.

Computer technology that allows officers to access more data quickly and easily can:

- Improve emergency and non-emergency assistance to the public
- Help inform administrative decision making
- Improve criminal investigations by identifying criminals and linking cases
- Provide information relevant to officer safety

The benefits of these technologies are leveraged when they are networked to allow for the quick and easy exchange of data. Otherwise, data sits in separate repositories resembling file cabinets, unable to be efficiently retrieved or analyzed. In order to "connect the dots", police develop local area networks (LAN) and connect to external sources of information. The illustration on the next page shows the topology for a basic police information system. As more electronic devices and software programs are added, the size of the LAN increases and communications become more complex.

Figure 1. Basic Police Information System Topology.
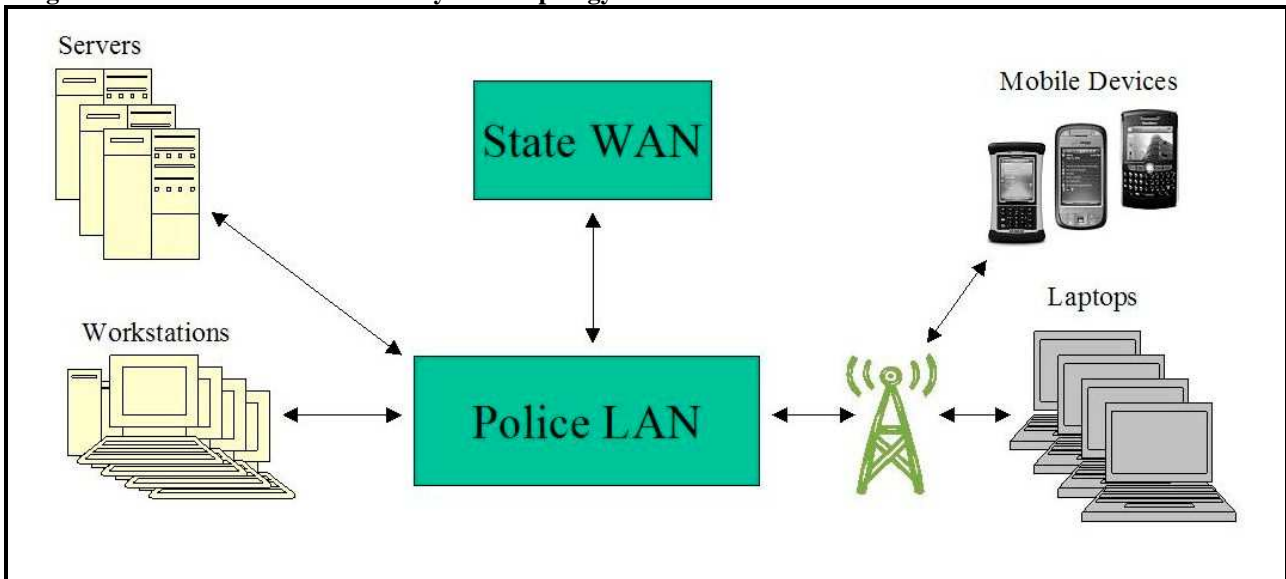
Police administrators are keen to implement police information systems to improve efficiency and to keep up with the increasing expectations of the public many of which use networked devices every day. Large metropolitan police departments with full-time IT staff and access to large grants have been successful in implementing such projects. National police organizations and the U.S. Department of Justice provide descriptions and derive best practices documents from the experiences of implementing information systems in these large agencies. Police administrators can use those studies to inform decisions about future technology projects of their own. However, large metropolitan police agencies are a minority in the U.S. According to a 2004 census conducted by the U.S. Department of Justice, Bureau of Justice Statistics (BJS), police departments with fewer than 10 employees comprised 55% of all police agencies nationwide (Reaves, 2004). Small police agencies would also like to reap the benefits of implementing information systems but may not find the conventional models of implementation practical.

Small police agencies are likely to face the following challenges:

- **Budget** – Information systems are costly, particularly the up-front costs of system hardware, software, and configuration. Although grants may be available to assist with initial expenditures, ongoing support and maintenance costs may still be out of reach for smaller law enforcement agencies.

- **Manpower** – It takes time for officers to learn how to use the new system. Time spent learning a new software program is time not spent preventing and responding to crime or attending to other police needs. Also, additional staff or redirection of existing staff may be needed to implement and support information systems as they become more complex.

5

- **Technological Barriers** – In rural areas, police may not have access to broadband Internet networks, particularly wireless broadband networks needed to transmit data to mobile devices.

The Maine Uniform Crime Reporting System indicates that approximately 50 percent of Maine's police departments consist of less than 10 full-time sworn officers (Maine, 2007). Municipal police departments of that size are not likely to have the resource capacity to implement the types of technical solutions that the national models recommend.

1.2. Purpose and Scope
The purpose of this research is to determine how police departments in Maine are using limited personnel and financial resources to implement police information systems.

Some of the goals of this research project are to:

- Identify the adoption rate of police information systems in Maine
- Inform discussions around the allocation of state and federal grants earmarked for law enforcement technology projects
- Give local police departments a glimpse of how their cohorts are addressing implementation challenges
- Suggest areas where efforts should be focused to reduce project costs and to provide the resources required for successful implementation

The lessons learned during this research need not be limited to the law enforcement community. Courts and corrections agencies, typically smaller than police agencies but who have an interest in much of the same data, may find similarities between the law enforcement experience with technology implementation and their own. In fact, any small municipal department facing increased demand for technology implementation may benefit from the experiences of those in the public safety field.

1.2.1. Assumptions
This document assumes that the reader will have a basic understanding of the functionality of CAD, RMS, and networking technologies used in the field of law enforcement. This document also refers to several federal guidelines for information exchange that the reader may or may not be entirely familiar with. Brief descriptions of terms related to law enforcement information systems and information exchange are provided in Appendix C.

1.2.2. Constraints
Surveys were distributed to municipal, county, and university law enforcement agencies. Due to a low response rate from county sheriff's offices (3) and university police departments (1), comparisons were not made between the three different types of law enforcement agencies.

1.3. Methodology

The researcher utilized a mixed-method approach during this research study. The major components of the research study were a literature review, a survey, and interviews. Each of those components is described in more detail below.

1.3.1. Review of Literature

A literature review was conducted to determine what research methods have previously been used to study the implementation of information systems in law enforcement and what opportunities existed for this author to contribute to that body of knowledge. Literature from published books, peer-reviewed journals, as well as written documents and video available on the Internet were sought. Several of those documents are referenced throughout this research report and can be found in Appendix A. Survey research was found to be the most common method used to study law enforcement information systems. The advantages of survey research include the ability to sample large study populations, providing a standard instrument from which to analyze responses, and surveys generally do not require a significant time investment on the respondent's part. Case studies were also frequently utilized by researchers to describe information system implementation. However, the vast majority of case studies focused on implementation in large police agencies. A search of literature specific to the experiences of Maine law enforcement agencies in implementing information systems yielded no results. Much of the analysis done in Maine involves crime statistics, or the outputs of such information systems, not the implementation of those systems.

1.3.2. Survey

There are 134 law enforcement agencies in Maine according to the Maine Department of Public Safety (Maine, 2007). Of those, 131 are municipal police agencies. Therefore, a survey was chosen as the most practical method of obtaining data for this research project. The surveys identified during the literature review were examined to determine what types of questions were frequently asked. These questions included demographic questions, questions about budgets, personnel, implementation challenges, and project outcomes. The author also consulted surveys from general e-government research for ideas on question format and content.

A draft survey was prepared and reviewed by subject matter experts from a variety of fields. Included among those experts was Professor Dahlia Lynn, Ph.D. at the Muskie School of Public Service and a group of key informants with expertise in public agency information systems. The key informants who assisted in this phase of the research included:
1. A public policy researcher with technology policy expertise in Maine
2. A public safety software provider whose company provides solutions for public safety agencies in Maine
3. A Senior Planner with the Maine Department of Public Safety

All three key informants offered suggestions that were incorporated in the survey instrument. Combining previous work with input from subject matter experts was designed to

strengthen the validity of the survey. The entire research project was also reviewed and received approval from the University of Southern Maine Institutional Review Board.

The survey was made available through the Internet using Surveymonkey.com. Prior to starting the survey, efforts were made to ensure confidentiality of survey data. The author determined that Surveymonkey.com takes the following steps to ensure the privacy and security of survey data:

- *Servers are kept in a limited-access environment requiring two-factor authentication for entry*
- *Servers are monitored using digital surveillance equipment*
- *Servers are kept in a climate-controlled facility*
- *The facility is staffed 24/7*
- *Servers are behind a firewall that restricts access to all ports except 80 (http) and 443 (https)*
- *Security audits are performed quarterly by a nationally award-winning security firm*
- *Data is stored on a RAID 10 setup and mirrored to a centralized backup system. Offsite backups are also done in case of a catastrophe*

Surveymonkey.com also offers optional SSL encryption. The researcher utilized that feature to ensure that communications between the web browser and the server were secure. A username and strong password were provided to each respondent to securely access the Internet-based survey. The author also used SSL encryption while accessing survey data from Surveymonkey servers. Surveymonkey.com will honor a request from an account holder to delete survey data from their primary and backup servers after a waiting period of 30 days. The author has requested that the data be deleted at the conclusion of this research project.

The author took several additional steps to ensure the privacy and security of the survey data accessed and stored through his home computer. These steps included:
- Applying the most recent anti-virus, firewall, operating system, and web browser updates and security patches
- Computer operating system authentication by username and strong password
- Deleting browser history, temporary internet files, and cache files before and after each visit to Surveymonkey.com
- Actual survey data was stored on a password protected USB device which was wiped at the completion of the research project using the Norton WipeInfo utility set to Department of Defense wiping standards.

1.3.3. Survey Distribution
An invitation letter was sent to the Chief law enforcement official in each municipal law enforcement agency in Maine. The invitation included a brief description of the research project as well as the URL and password for access to the survey web page. The invitation directed the Chief law enforcement officer to have the employee responsible for the day-to-day operation of the agency's information systems complete the survey.

Any agency that did not submit a response within two weeks received a reminder invitation with the URL and password included. A printed copy of the survey and self-addressed, stamped return envelope was also included to encourage participation.

1.3.4. Interviews

Once the survey data was reviewed and organized, respondents who provided survey answers suggesting that implementation of their police information systems had been particularly successful or unsuccessful were sought for follow-up interviews. Those who provided answers that were outside what appeared to be the norm were also sought for confirmation and additional data. A semi-structured instrument was prepared prior to each interview to ensure that the data needed would be requested. However, once those questions were answered, interviewees could take the conversation in any direction they wished. A total of ten interviews were conducted over the telephone in this manner.

2. Survey Findings & Analysis

A total of 131 law enforcement agencies were invited to participate in this research project. Of those, 47 agencies completed the survey yielding a response rate of 36%. The survey was organized into five parts covering: demographic information, questions related to the management of the police information system, the information system budget, implementation challenges, and several open-ended questions related to implementation.

2.1 Survey Demographics

The first several survey questions asked who completed the survey, what municipality they worked for, and how many full-time equivalent employees (FTE) are employed by the law enforcement agency. Some additional geographic and budget analysis is presented in this section of the report so that the survey population is more accurately described.

2.1.1. Rank/Title Demographic

Two-thirds of the respondents held rank as police administrators. There was an equal percentage (8.5%) of police middle managers and IT staff participating. Dispatchers made up 6.4% of the total followed by clerical staff, patrol officers, and one unknown.

Table 1. Respondents by Rank/Title.

Rank/Title	Response Count (N=47)	Percent of Total
Police Chiefs/Administrative Staff	31	66.0%
Police Supervisors (Middle Management)	4	8.5%
IT Administrators and Staff	4	8.5%
Dispatch Supervisors/Dispatchers	3	6.4%
Clerical Staff	2	4.3%
Police Officers	2	4.3%
Undisclosed	1	2.0%

Assuming the survey was passed along to the person in charge of the day-to-day management of the police information system as requested in the invitation letter, the result in Table 1 suggests that in Maine, that responsibility overwhelmingly resides at the top of the police

organization. In small police departments, police chiefs tend to be generalists by necessity. They must be able to guide the police department and its staff, prepare budgets, respond to citizens and political leaders, and as this research confirms, they must be prepared with the technical expertise to manage and support their local information system.

2.1.2. Population Demographic

The size of the population served by a law enforcement agency often correlates to the number of calls for service handled by the agency, the size of the agency in terms of personnel, and the size of its budget. Generally, the more people served by a law enforcement agency, the more calls for service it handles and therefore, the more data it must manage. In this study, population size was divided into five ranges and the percent of respondents from each range were calculated. The proportion of each population group is shown in Figure 2.

Figure 2. Percent of Survey Responses by Population Served

Legend:
- 0 - 4999
- 5000 - 9999
- 10,000 - 14,999
- 15,000 - 19,999
- 20,000+
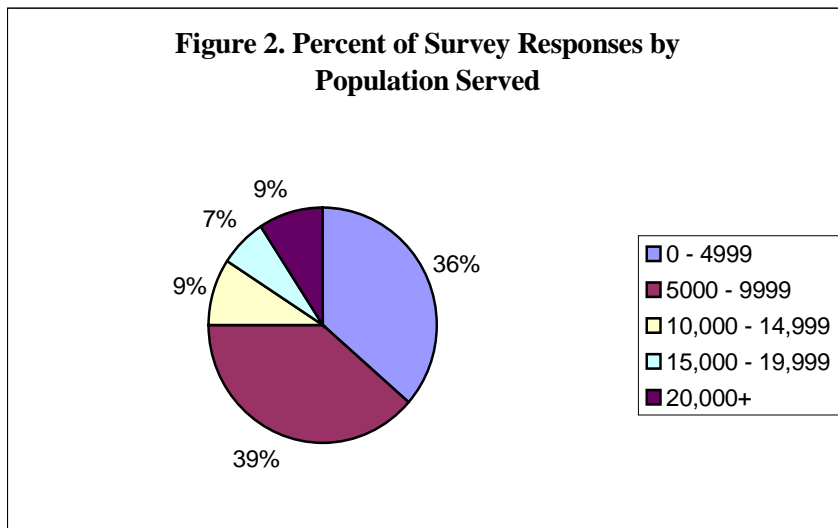
Census figures from the 2000 census were used to determine population in each responding municipality since not all towns were represented in the 2006 census (U.S. Census, 2008). The majority of respondents (75%) were from law enforcement agencies serving less than 10,000 people. This was only two percent higher than the percentage of all Maine police departments serving under 10,000 people, which was 73% (Maine, 2006). The mean population size served among respondents was compared to Census figures for all Maine towns with their own police departments. The survey group had a mean population size of 8194 compared to a mean of 9863 people for all Maine municipalities. The standard deviation for the respondent group was 6007.5. The distribution was found to have a moderately positive skew (Pearson's Skewness Statistic = 0.4). Therefore, the usual population value is more likely to be between the median (7410) and the mean (8194).

These comparisons suggest that the respondent sample is slightly more representative of police departments who serve less than 10,000 people.

2.1.3. Responses by Number of FTE's

Sixty point four percent of responding agencies reported having less than 15 full-time employees (FTE's). The number of FTE's provides an indication of the number of information system users that must be supported. It is also a reasonable assumption that the more users, the more computers the law enforcement agency is likely to have for them to use and the more complex the police information system is likely to be.

Figure 3. Responses by Number of Full-Time Employees
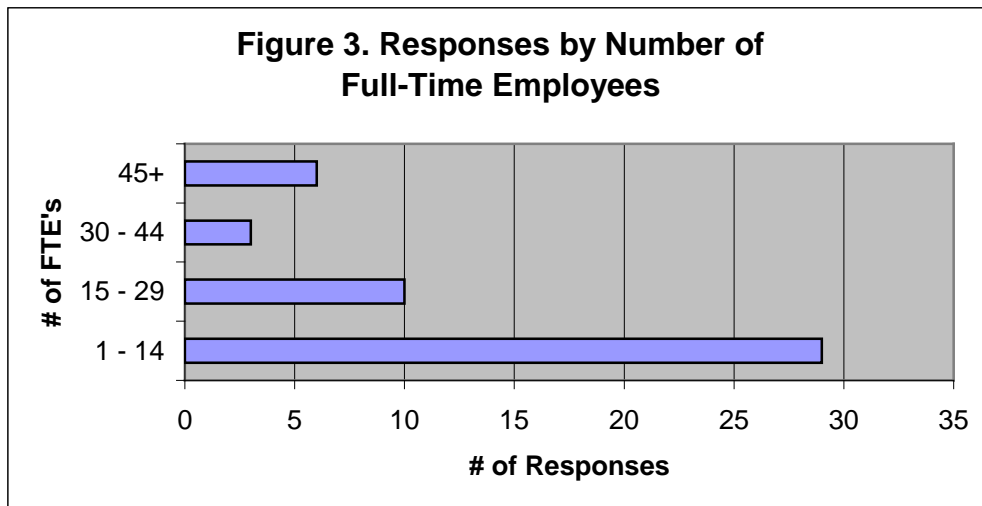
The lowest number of FTE's reported by respondents was 1 and the highest number of FTE's was 70. UCR data indicates that only three police agencies in Maine exceeded 70 personnel in 2006 (Maine, 2006).

The mean number of FTE's reported was 19. According to Maine's UCR data for 2006, the mean number of sworn and civilian personnel in Maine's police agencies was 18 (Maine, 2006). The UCR data was expected to have a slightly lower mean because the data does not include part-time officers who would be included in the FTE calculation.

The majority of survey respondents (60.4%) had between 1 and 14 FTE's compared to the entire state which had 56.1% in that range according to UCR data (Maine, 2006). Therefore, it appears that the respondent group is representative of the state as a whole in terms of agency size.

2.1.4. Responses by County

Survey participants represent fifteen of Maine's sixteen counties. The only county for which there were no respondents was Waldo County located in the east/central part of the state. Waldo County has the fewest number of law enforcement agencies of any other county in the state with only two municipal police departments and one county sheriff's office. The lack of a response from within Waldo County is not likely to have an affect the overall results of the survey. Municipalities in York and Cumberland Counties provided the most number of responses.

Figure 4. Number of Responses by County
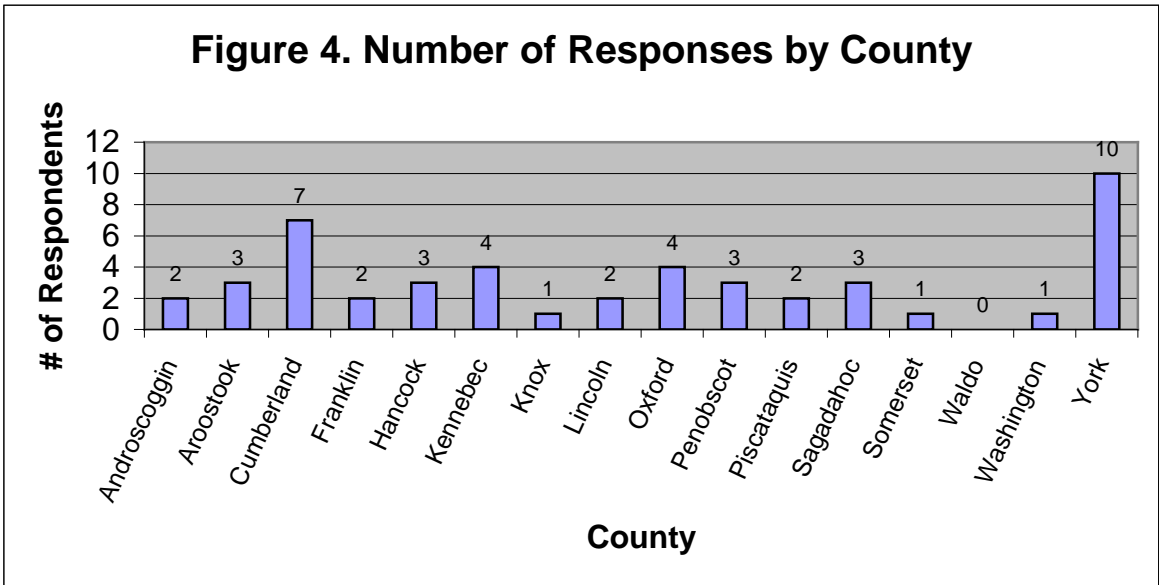
While municipalities in York and Cumberland Counties make up 35% of the survey population, law enforcement agencies in those counties make up only 24% of the agencies statewide. The higher response from southern Maine may be attributed to the author's name recognition and professional relationships with survey respondents in that area. Several of the respondents from York County have assisted the author during a recent information system installation.

Where regional differences were found to have an affect on data analysis, responses from York and Cumberland Counties were separated from other responses to show those variations (Sections 2.3.1. and 2.3.3.).

2.1.5. Responses by Size of Annual Operating Budget

Also of interest is the number of respondents by size of their information system budget. Respondents were asked about the size of their annual operating budget for information systems in question 9 of the survey. Budget size was divided into the four ranges shown in Figure 5.

Figure 5. Responses by Size of Annual Police Information System Budget
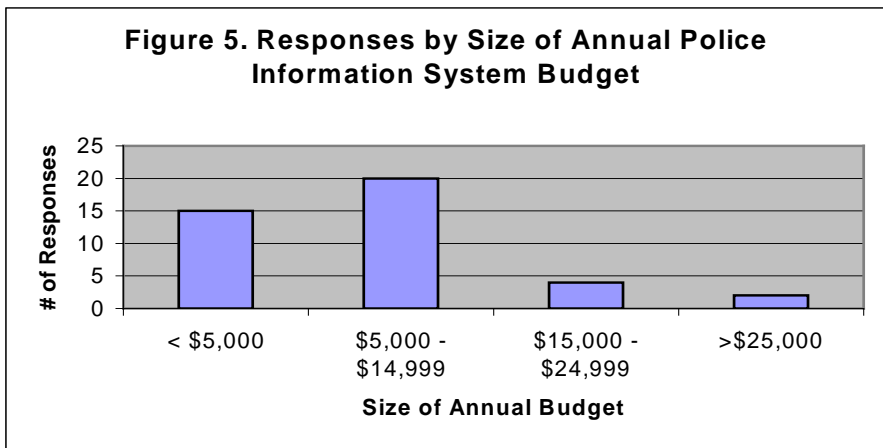
Most municipalities who responded spent less than $15,000 on their police information systems last year, excluding personnel costs. Non-personnel costs include hardware, software, and technical support. The amount spent on information systems will vary depending on the stage of implementation. For example, up-front costs for new systems will be higher than the ongoing maintenance costs for mature systems. These budget numbers should only be taken as a rough guide of what is being spent on police information systems. Some additional budget analysis appears later in this report in an effort to distinguish differences between York and Cumberland Counties versus the rest of Maine.

2.2 Analysis of Survey Responses

The survey was divided into sections with like questions grouped together. The groups included several general questions about information system adoption, budgets, personnel, implementation challenges, and project outcomes.

2.2.1. Adoption Rate of Police Information Systems

All of the survey respondents indicated that they utilized computerized information systems in their local police department.   This result confirmed that the respondent group would provide relevant data for this study.

2.2.2 Responses by Type of Technology in Use

There are several different categories of police information systems based on the type of task they perform and/or the type of devices used to interface with the system. The most popular systems are Computer-Aided Dispatch (CAD) and Records Management Systems (RMS). CAD systems are designed to input and organize call information originating outside of the agency. RMS systems store police reports, arrest information, and other internal data routinely used by the police department. Similar to RMS are intranets which allow police personnel to share information with each other such as email and criminal intelligence information. Also popular are mobile computers installed in police vehicles. These computers allow officers to access information from a variety of federal and state criminal record databases, motor vehicle databases, as well as the home agency's RMS and CAD databases. Handheld electronic devices including smart phones, Blackberry's, and personal digital assistants (PDA), can also be interfaced with some police information systems.

A majority of survey respondents are utilizing CAD, RMS, and mobile computer systems. Several respondents commented that they do not manage the CAD system themselves, rather they share a CAD system with another nearby municipality or county sheriff's office. Therefore the number of agencies utilizing CAD systems is higher than indicated in Table 2.

Table 2. Percent of information system use by type.

Information System Type	Response Percent
Computer Aided Dispatch (CAD)	66.0%
Records Management System (RMS)	93.6%
Mobile Computers in Police Vehicles	80.9%
Intranets	31.9%
Handheld Electronic Devices	8.5%

Nationally, the use of handheld devices appears to be the direction that new law enforcement technology is headed. New York Mayor Michael Bloomberg, for example, has recently offered a monetary incentive for anyone who can produce a handheld device that will analyze and compare DNA in the field (Hanson, 2008). With only 8.5% of respondents utilizing handheld devices, there appears to be a lot of room for growth in the use of handheld technologies in Maine. As those devices become more available, information systems will need to be upgraded or replaced to accommodate that growth. Maine law enforcement agencies should look to the future and select vendors whose products can be scaled up to support a variety of mobile devices.

2.2.3. How Police Information Systems are Managed

The survey asked respondents several questions about how their information system is managed. Of interest is whether law enforcement agencies are implementing information systems in-house or are relying on expertise outside the police department. According to the responses, over 2/3 of municipalities said that day-to-day management of police information systems is handled within the police department itself. Sixteen point seven percent indicated that the police information system was managed by the municipal information technology (IT) department and 19% indicated that management of the police information system is a collaborative effort between representatives from several departments within the municipality. Six respondents indicated that their county sheriff's department managed their information systems and one said that they shared responsibility with a neighboring municipality. Only one respondent indicated that they received support from a private-sector computer specialist. The consultant is an outside contractor who assists as needed with networking issues. That particular agency shares a database with surrounding agencies and their county sheriff's department.

2.2.4. How Many Individuals Manage & Support Police Information Systems

The survey responses indicated that there are usually only 1-2 people in each municipality who help manage and support their police information system. Seventy-nine point one percent of respondents said that 1-2 people manage their system compared to 20.9% who said that 3-5 people manage and support their systems. In no case did any respondent indicate that 5 or more individuals managed and supported their police information systems. The results show that at least 61 people are involved with police information systems within the respondent group. This figure suggests that there are a minimum of 186 people across the state who are managing and supporting police information systems.

2.2.5. Sworn/Unsworn Status of Police Information System Personnel

The survey also asked whether or not the personnel managing the police information system were sworn law enforcement officers. Forty-two point six percent of respondents indicated that the individuals managing their information system were sworn police officers. Thirty-four point zero percent indicated that both sworn and unsworn personnel manage the systems and 17.0% said that the system was managed by unsworn personnel. Six point four percent responded, "Don't Know". The results mean that a significant number of police departments are utilizing people who are trained as police officers to manage and support their information systems. This result is consistent with what would be expected in smaller police departments where it would be difficult to justify hiring specialized civilian personnel to manage the information systems.

2.2.6. Level of Information System Expertise

With a significant number of law enforcement information systems being managed from within the police department by sworn police officers, it is important to consider the level of IT expertise they possess. The survey included a question regarding the IT expertise of those managing police information systems. A total of 124 individuals were identified as having some knowledge of technology ranging from introductory computer training to having a college degree in computer science. Of those 124 individuals, 10 (8%) were reported as having a college degree in computer science or related field. Eighteen (15%) individuals were reported to have a professional IT certification. The majority of respondents said that the people managing their information system did not have a college degree in computer science or hold a professional IT certification. Instead, the majority of respondents rely on individuals who have received some formal training, including vendor-specific training in information systems.

Table 3 shows the difference in responses between the level of computer training among those who indicated that sworn personnel manage and support their information system compared to those with unsworn personnel. Those respondents who indicated that both sworn and unsworn personnel manage their information system were excluded from the table.

Table 3. Levels of Computer Training by Sworn and Unsworn Personnel (N = 34).

|	Sworn personnel	Unsworn personnel
a. Have a college degree in computer science or related field	2	4
b. Hold a professional IT certification	2	10
c. Neither a. nor b. but have received formal training related to information systems, including vendor-specific training	21	17
d. None of the above but have received other computer training not directly related to information systems (ex. Word processing, digital imaging, etc.)	13	8

The responses indicate that sworn personnel tend to have a lower level of computer training than their unsworn counterparts. The unsworn personnel may include municipal IT staff who would tend to have more computer expertise than the average police officer. Of note are the two police agencies whose police information system is staffed by sworn police officers with college degrees in computer science or related field. During a personal interview, one of those respondents indicated that some luck was involved in their circumstance. Someone with a degree in computer science had decided to make a career change and they were able to hire the person as a police officer. It does not appear that police departments have begun recruiting based on level of IT expertise.

Overall, IT expertise is the exception rather than the rule among sworn police personnel. This situation indicates that efforts to increase the level of IT expertise among sworn police officers are worth pursuing.

2.2.7. Information System Duties

Another item of interest is what duties are assigned to the individuals responsible for managing the police information system. Respondents were asked about nine common duties related to police information systems and whether or not they were assigned to perform them.

Figure 6. Duties Assigned to Individuals Who Manage Police Information Systems.
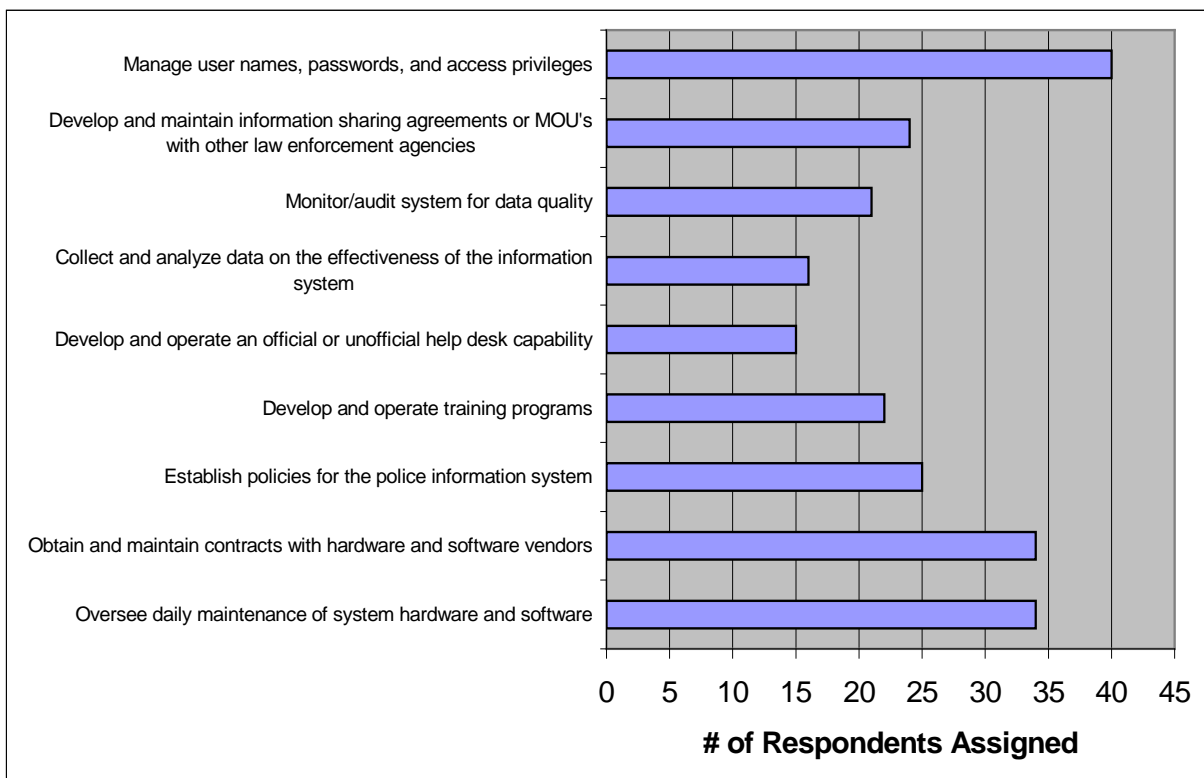
The duty most often assigned was the management of access privileges on the system. That duty was assigned 95.2% of the time. Other duties often assigned included obtaining and

maintaining contracts with hardware and software vendors and the daily maintenance of hardware and software. Ranking low on the list of duties is maintaining a help desk for users and collecting data on the effectiveness of the information system. The lack of a help desk capability could be rooted in several factors and requires more study. For example, help desk support might be dependent upon the level of information system expertise within the department, staffing limitations, or the quality of other sources for help including user's manuals, online help, or vendor support.

The apparent lack of quality control may not be as problematic when information is confined within the agency's own system, but as systems are linked across the state to share information, data quality will be a critical issue. Audits for compliance with UCR, National Incident Based Reporting System (NIBRS) standards and 28 CFR Part 23 will help insure data quality but data not covered by those standards will need to be monitored by the originating agency. Auditing/quality control appears to be an area where capacity building efforts might be beneficial.

2.2.8. Information System Policies

Respondents were asked if they had personnel policies governing the use of police information systems. Eighty point nine percent of respondents indicated that they did have such policies. The high number of agencies reporting having such policies in place makes sense because such policies are often a pre-requisite for information sharing with other government entities. The good news is that the 19% of agencies that do not have those personnel policies in place do not have to start from scratch. Instead, a simple networking effort would allow them to personalize policies at other agencies to fit their own agency.

2.2.9. Federal Guidelines for Information Exchange

As more and more police information systems become networked to enable better information exchange, it is important to consider to what extent local police information systems are compatible with federal guidelines and tools for information exchange. Respondents were asked about eight different guidelines and tools for information exchange to see how prepared they are to exchange data with other information systems.

Table 4. Compliance with Federal Guidelines and Tools for Information Exchange.

Question: *Does your agency comply with the following federal guidelines and tools for information exchange?*			
Federal Guideline	**Yes**	**No**	**Don't Know**
Global Justice XML for data exchange (GJXDM)	8.9%	22.2%	68.9%
National Criminal Intelligence Sharing Plan (NCISP)	20.5%	15.9%	63.6%
Justice Information Exchange Model (JIEM)	6.8%	22.7%	70.5%
National Information Exchange Model (NIEM)	4.7%	20.9%	74.4%
Law Enforcement Information Technology Standards Council (LEITSC) Records Management Systems (RMS) Standard	15.9%	13.6%	70.5%
Law Enforcement Information Technology Standards Council (LEITSC) Computer Aided Dispatch (CAD) Standard	18.2%	15.9%	65.9%
28 Code of Federal Regulations (CFR) Part 23	22.7%	9.1%	68.2%
Federal Information Processing Standards (FIPS) 1/0-2 Encryption	9.1%	15.9%	75.0%

The figure above shows that most respondents are not aware of whether or not they comply with federal guidelines for information exchange. Although this result calls into question the validity of the "Yes" and "No" responses, the significant number of "Don't Know" responses still yields valuable data for analysis. There are several potential reasons why federal guidelines aren't on the radar screens of the survey respondents. For example, it is possible that many law enforcement agencies are in compliance with these guidelines but just aren't aware of that fact. There may be a lack of effective communication between federal and local authorities about each guideline or it may be that software vendors are not providing this information about their products. It is also quite possible that other information system features and functions take priority in local applications.

The importance of federal guidelines for information exchange cannot be understated. For the mission-critical tasks performed by police, obtaining good results means providing the right information to the right people at the right time. The federal guidelines listed in Table 4 help to accelerate systems development, they make it easier to link information across jurisdictions, and they create standards that make the use and support of information systems easier.

In addition to those benefits, adherence to federal standards also holds potential cost-saving benefits for police departments. Proprietary database and file formats serve the interests of individual vendors, not the long-run interests of a police department that wishes to expand its information sharing capability. For example, an information system that "speaks" GJXDM would not require expensive translation software or "middleware" to communicate with other systems. The research and development cost have already been borne by the federal government so that expensive proprietary software can be avoided.

The survey results indicate that more should be done to promote awareness of information sharing guidelines and their importance to having an effective information system.

2.2.10. Strategic Planning in Information Technology

The survey asked respondents whether or not their municipality had an IT strategic plan and if so, if their police information system was incorporated into that plan. Only six respondents stated that their municipality had an IT strategic plan and of those six, only three indicated that their police information system was part of the plan. Those that had IT strategic plans covering their police departments were not from large municipalities. Given the complexity and expense of IT infrastructure in larger municipalities, it does not bode well that police departments may not have the proper guidance when making decisions related to the implementation of information systems.

The benefits of developing a strategic plan for IT include but are not limited to: making a case for implementing new technology, justifying expenses, avoiding obsolescence and costly mistakes, assuring that standards are met, and working towards interoperability with other local, state, and federal law enforcement databases. One respondent remarked during an interview that had it not been for their strategic plan, the police department might not have been able to justify

the purchase of new information system hardware and software. Given the potential benefits of strategic planning, it appears to be a worthwhile effort for police departments implementing information systems.

2.3. Budget Questions

There were three questions asked regarding police information system budgets. The questions provide a glimpse of how much is being spent on information systems, what that money is being spent on, and if police departments are pooling resources to increase buying power.

2.3.1. Size of Police Information System Budgets

Each respondent was asked about the size of their annual police information system budget excluding personnel costs. (See section 2.1.5) Data gleaned from the budget question was combined with regional data for more in-depth analysis. Recall that there were a higher percentage of respondents from York and Cumberland counties. To adjust for skew in the survey data, the results from York and Cumberland county agencies were separated from all other Maine counties. The results are shown in Figure 7.

Figure 7. Police Information System Spending by Region
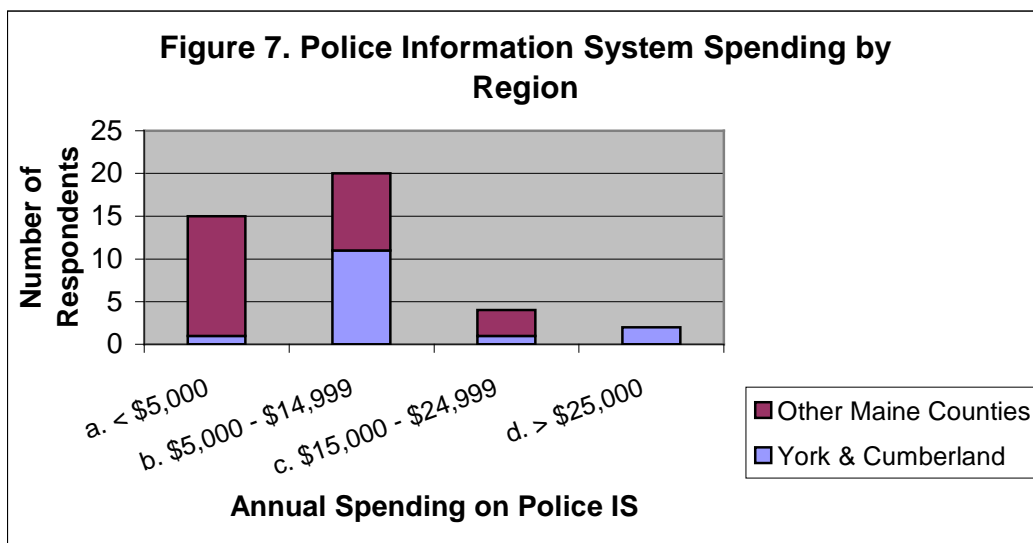
Most spending on police information systems range from $5000 - $14,999 annually. However, nearly all of those respondents who reported spending less than $5000 were from outside of York and Cumberland counties. The spending trends are consistent with the underlying economic conditions in York and Cumberland Counties versus the rest of the state. It should not necessarily be concluded from this data that police departments in central and northern Maine need more money for information systems. A number of additional factors would have to be considered including the stage of implementation each respondent is in, the software being used, the size of the agency, etc.

2.3.2. Responses by Budget Categories

Respondents were asked what percentage of their information system budget they spent on hardware, software and technical support. The data indicated that several respondents may have included personnel or other costs when calculating their percentages while others divided their entire budget between each of the three categories. In retrospect, the question should have been specific about excluding personnel costs and/or should have included a category for "Other" spending. Data from those who divided their police information system budget up among the three categories (N=22) were averaged to determine the mean percentage of spending in each category. The resulting means were:

Table 5. Mean Percentage of Budget Spending by Category. (N=22)

Spending Category	Percentage of Budget
Hardware:	34%
Software:	34%
Technical Support:	32%

A closer look at the data revealed a wide variation between respondents. For example, one respondent spent 100% on software and another spent 100% on technical support. Others spent heavily on hardware.

This question asked for spending during the last fiscal year. What a municipality spends on a police information system in a given year may be influenced by several factors including what stage of implementation they are in, hardware/software upgrades, unexpected hardware failures, etc. The data would have been more useful had the question asked respondents to average the percentage of their police information system spending over a period of years and then assign the multi-year averages to each category.

2.3.3. Leveraging Resources

The last budget-related question asked about the extent to which the law enforcement agency pools resources with other law enforcement agencies in their region to purchase hardware, software, or to provide technical support. The majority of respondents have chosen not to pool their resources as shown in Table 6.

Table 6. Resource Sharing by Category.

Question: *Does your law enforcement agency pool resources with other law enforcement agencies in your region:*	Yes	No	Don't Know
To purchase hardware:	39.5% (17)	60.5% (26)	0% (0)
To purchase software:	37.2% (16)	60.5% (26)	2.3% (1)
To provide technical support:	46.5% (20)	53.5% (23)	0% (0)

The data is not consistent when data from York and Cumberland County are compared to the rest of Maine. Jurisdictions in York and Cumberland County appear much more likely to "go it alone" and implement their own information systems. Table 7 shows that 70.0-76.5% of jurisdictions outside of York and Cumberland County pool resources to purchase hardware, software, and technical support compared to only 23.5-30.0% of jurisdictions in York and

Cumberland Counties. Annual spending data suggests those agencies in York and Cumberland Counties can afford to implement information systems independent from one another. One respondent indicated that some agencies in central Maine had purchased a software solution that was much more expensive than the software more popular in southern Maine. He suggested that pooling resources became a necessity in order to implement the more expensive software.

Table 7. Resource Sharing by Category and Region.

	Yes			No	
	York & Cumb	All Others		York & Cumb	All Others
To purchase hardware:	23.5%	76.5%		46.0%	54.0%
To purchase software:	25.0%	75.0%		46.0%	54.0%
To provide technical support:	30.0%	70.0%		43.5%	56.5%

There are significant differences in police information system budgets that have implications for the future of interoperability. For example, if a police department is forced to settle for an inexpensive software solution that does not save data in a format readily compatible with data from other agencies, the future cost associated with translating the data to a standardized format may exceed the cost of having purchased a more expensive and more compatible system to begin with. Therefore, it seems prudent to provide adequate grant funding for police information systems and tie grant money to technologies that ensure future compatibility and meet information sharing standards.

2.4. Organizational Changes

The next series of survey questions were designed to gather data about organizational changes that were the result of implementing information systems. The questions provide a glimpse into staffing changes, role changes, changes in demands, and efficiency.

2.4.1. Organizational Change as the Result of Police Information System Implementation

More than eighty-two percent of respondents indicated that the implementation of new police information system technologies had changed their local police department. Only 13.3% said that no changes had occurred in their police department and 4.4% responded, "Don't Know".

2.4.2. Impacts on Police Staff

A follow-up question asked about four different impacts that information systems might have on police staff. When asked if the number of police staff had been reduced as a result of information systems, only one respondent out of the thirty-seven said that the number of police staff had decreased. Fifteen respondents (40.5%) indicated that information systems had changed the role of police staff. Seventeen respondents (45.9%) said that police information systems had increased demands on police staff. Part four of the question asked if information systems had made police operations more efficient. Thirty-four out of thirty-seven respondents (91.9%) said that police information systems had made police operations more efficient. Clearly, one of the most significant benefits to police information systems is efficiency. Increased

efficiency is an often-used selling point when adopting new technologies and it appears that those claims are actually true.

The four types of changes measured in this question are only a sample of the potential changes that a police or IT department might experience after implementing a new information system. While efficiency gains represent a major positive effect for the police organization as a whole, more should be considered in regards to the effects of information systems on those who manage and support them, 66% of whom are police administrators. For example, these police administrators must occasionally divert attention from other police work to correct problems with their information systems. The frequency, length of time it takes to resolve system trouble, and the unpredictable nature of system troubles are likely to eat away at the efficiency of completing administrative tasks. What organizational changes are made to help the police agency absorb those impacts and the overall effect these changes have on the police organization requires further study. Even so, efforts that focus on funding, training, and standardization can all have an impact on lessening the burden that these systems might have on the police administrators that are managing them.

2.4.3. Impacts on IT Staff
The next four-part question closely resembled the previous question but asked about the impact police information systems have had on IT staff. There were no reported reductions in IT staff as a result of implementing police information systems. Eight respondents (25.8%) indicated that the role of IT staff had changed. Twenty-three respondents (74.2%) said that demands on IT staff had increased as a result of police information systems. Twelve respondents (38.7%) indicated that implementation of police information systems had made IT operations more efficient. The data suggests that the potential negative effects of police information system implementation are mostly absorbed by IT staff, and they do not benefit as much as police in terms of efficiency.

The data collected in this survey allows for an analysis of when responsibilities for police information systems begin to shift from police staff to IT staff based on the size of the police agency. The mean number of full-time police employees among those respondents who reported that municipal IT staff managed and supported their police information system was 36 FTE's. The fewest number of FTE's supported by IT staff was 19. Therefore, police agencies whose staffing levels are between 19 and 36 FTE's who currently have police staff managing and supporting their police information system might want to consider this transition in their strategic planning efforts.

2.5. Implementation Challenges
The next three survey questions focused on implementation challenges. Multiple challenges and concerns were listed in the first two questions and one open-ended question gave respondents a chance to provide additional information about specific challenges. The results identify specific challenge areas and also indicate where information system managers are focusing their attention.

2.5.1. Frequency of Common Implementation Challenges

The goal of the next question was to reveal the frequency of several implementation challenges faced by those who manage police information systems. Respondents were given a list of thirteen challenges and were asked to rate how problematic each was on a three-point scale. Table 8 shows how the survey participants responded.

Table 8. Frequency of Select Problems in Implementing Information Systems.

13. Please indicate whether any of the following issues have been problematic in implementing technology within your police department:	Frequent Problem	Sometimes Problematic	No Problem	Don't Know
Lack of IT staff	34.1% (15)	**43.2% (19)**	20.5% (9)	2.3% (1)
Personnel training	11.4% (5)	**65.9% (29)**	22.7% (10)	0.0% (0)
Resistance to use	11.4% (5)	**43.2% (19)**	**43.2% (19)**	2.3% (1)
Resistance to organizational change	6.8% (3)	**47.7% (21)**	45.5% (20)	0.0% (0)
Equipment performance	11.4% (5)	**63.6% (28)**	25.0% (11)	0.0% (0)
Equipment reliability	6.8% (3)	**50.0% (22)**	43.2% (19)	0.0% (0)
Information security	2.3% (1)	9.1% (4)	**84.1% (37)**	4.5% (2)
Interoperability with legacy systems	9.1% (4)	9.1% (4)	29.5% (13)	**52.3% (23)**
Lack of wireless broadband infrastructure in your area	9.1% (4)	22.7% (10)	**63.6% (28)**	4.5% (2)
Initial costs	**41.9% (18)**	39.5% (17)	18.6% (8)	0.0% (0)
Ongoing support costs	36.4% (16)	**38.6% (17)**	25.0% (11)	0.0% (0)
Vendor service	11.6% (5)	32.6% (14)	**51.2% (22)**	4.7% (2)
Under-utilization of information system capacity	11.4% (5)	**45.5% (20)**	34.1% (15)	9.1% (4)

The most frequent problem identified by respondents was initial costs followed closely by ongoing support costs and lack of IT staff. Initial costs include hardware, software, and set-up costs. One police chief interviewed estimated his initial costs to be in the neighborhood of $200,000.00. Ongoing support costs include technical support agreements, hardware maintenance and replacement costs, and training new employees on the system. One respondent who is considering a new police information system said that the yearly maintenance cost of the new system (typically 20% of initial costs) is greater than his current annual IT budget.

Nearly 57% of respondents indicated that "under-utilization of information system capacity" was sometimes to frequently problematic. High costs and lack of IT staff may force police departments to make decisions that limit the overall effectiveness of the system. For example, an agency might implement a CAD and RMS solution without purchasing an information-sharing module, mapping module, data translation from legacy systems, or other

useful features. The data suggests that under-utilization of information systems is a problem that deserves attention.

Rated least problematic by a significant margin was information security. There may be several reasons for this. Police information systems are often situated within a municipal LAN where existing security can be scaled to meet police needs. In addition, software vendors and wireless communications vendors offer relatively simple methods for enabling encryption and Internet protocol-based security.

Obtaining funds for a quality system and developing technological expertise are critical to implementing an effective police information system. The responses to this question suggest that solutions need to be found that address those challenges.

2.5.2. Technical Concerns in Information System Implementation

To learn more about factors affecting decision making related to police information systems, survey respondents were asked to rate their level of concern about ten issues that often come up in literature and training on police information systems. The results of that question are presented in Table 9.

Table 9. Implementation Concerns.

Question: Among the following, identify your level of concern about these technical issues in implementing police information systems:

	Greatest Concern		Average Concern		Least Concern	Rating Average
Acquiring funding	**47.7% (21)**	18.2% (8)	34.1% (15)	0.0% (0)	0.0% (0)	1.86
Need for IT specialists	**36.4% (16)**	18.2% (8)	34.1% (15)	4.5% (2)	6.8% (3)	2.27
Information security	**29.5% (13)**	20.5% (9)	25.0% (11)	0.0% (0)	25.0% (11)	2.70
Continuity of operations in an emergency/disaster	20.5% (9)	13.6% (6)	**47.7% (21)**	9.1% (4)	9.1% (4)	2.73
Lack of affordable training	15.9% (7)	6.8% (3)	**54.5% (24)**	6.8% (3)	15.9% (7)	3.00
Technology integration with courts, corrections	14.0% (6)	11.6% (5)	**48.8% (21)**	11.6% (5)	14.0% (6)	3.00
Regulatory compliance	13.6% (6)	11.4% (5)	**47.7% (21)**	11.4% (5)	15.9% (7)	3.05
Obsolescence	12.2% (5)	12.2% (5)	**48.8% (20)**	4.9% (2)	22.0% (9)	3.12
E-discovery, Freedom of Access requests	7.0% (3)	7.0% (3)	**55.8% (24)**	9.3% (4)	20.9% (9)	3.30
Lack of broadband infrastructure	7.0% (3)	9.3% (4)	**34.9% (15)**	23.3% (10)	25.6% (11)	3.51

Each concern was rated on a five-point scale where 1 = greatest concern and 5 = least concern. The average level of concern for each variable was calculated allowing each to be ranked by overall level of concern. The table above shows each concern in the order of highest average concern to lowest average concern. Funding was the highest concern among respondents. The need for IT specialists ranked second. This is consistent with the previous question regarding implementation challenges.

Lack of broadband infrastructure was of least concern among respondents; however, the future availability of wireless broadband should remain a concern. As police information systems are improved to allow the exchange of images and streaming video, there will need to be corresponding improvements in wireless telecommunications for access through mobile computers and handheld devices.

2.5.3. Identifying the Greatest Challenge in 3-5 Years
The first open-ended question asked: "What is the greatest technological challenge your police department faces in the next 3-5 years?" Thirty-nine people answered this question. Responses were coded by keyword and ranked according to the frequency that each keyword was mentioned.

Funding again took center stage, garnering the majority of responses. Respondents mentioned both the cost of system upgrades and ongoing maintenance costs. The tone of several responses suggested desperation. The second-most mentioned challenge was "keeping up". Most respondents mentioned keeping up in the context of funding but there was also mention of keeping up with training on new technologies. In spite of these difficult challenges, most responses indicated a general interest in moving forward with technology implementation.

2.6. Open-Ended Questions
The last two survey questions were open-ended. One question asked about implementation successes and the other question provided respondents an opportunity to make any general comments they wished about the implementation of police information systems. Like the previous question, responses were coded by keyword. The frequency of each keyword was then tallied and ranked for analysis.

2.6.1. Factors in Making Information System Implementation Successful
The most important factors to successful implementation were requested in the next question. Training was the most frequent success factor mentioned followed by IT support. "Funding" and "ease of use" tied for the third most important success factor.

Training was mentioned in ten of the thirty-five responses to this question. The quality of training and access to training were each mentioned as positive aspects of training. One response indicated that training has been problematic because it is done informally.

Other success factors included, "vendor support", "Buy-in by officers", and "Doing our homework and testing various systems prior to purchasing".

Only one response indicated that implementation had not succeeded. The respondent attributed the failure to poor support from IT staff and from other vendors. This response shows that lacking any one or two of these success factors can mean trouble during implementation.

2.6.2. Additional Commentary

Grants were mentioned most frequently in the last survey question. Respondents indicated that they rely heavily on grant funding to purchase new police information systems. User-friendliness and affordable training were also mentioned.

One respondent expressed some concern over being able to "keep up" during the tough economic times that appear to be on the horizon. Indeed, large expenditures such as new information systems will be difficult to obtain approval for during times when taxpayers are stressed by an economic slowdown. On the other hand, these conditions make it a good time to explore ways that costs can be reduced.

3. Recommendations

The survey results indicate that the biggest challenges to the implementation of police information systems are funding and acquiring technological expertise. Fiscal solutions should focus on ways to generate new revenue streams and reduce costs. Solutions for increasing technological expertise should seek to deliver technical knowledge to those who manage and support these systems.

There are several solutions that address both the funding and technical challenges together. Those solutions include the development of IT strategic plans and a broadly coordinated strategic IT architecture involving federal, state, and local justice agencies. There appear to be opportunities to leverage resources by partnering with other agencies to purchase hardware, software, or to provide technical support. Finally, there appear to be opportunities to improve the content and delivery of training currently offered to those who manage and support information systems.

3.1. Strategic Planning

Relatively few respondents indicated that their municipality had a strategic plan in effect that incorporated their police information system. Those who reported having a strategic plan reported success during implementation. One respondent even remarked that had it not been for their strategic plan, they might not have been able to implement the system that they most desired.

The process of strategic planning and the plan itself can prove beneficial to law enforcement agencies. For example, getting stakeholders together to talk about the different aspects of information system implementation can help law enforcement officials make more informed purchasing decisions. An analysis of the police agency's strengths, weaknesses, opportunities, and threats would help identify gaps in training and identify resources where technical assistance can be obtained. Additionally, several challenges identified in this research can be addressed during the formation of a strategic plan:
- Interoperability with other information systems
- Inter-agency resource sharing
- Staffing levels and duties
- Budgeting for recurring costs and replacement costs

- Anticipated evolution of technology towards handheld devices

The strategic plan document can also serve as a guide for the project manager during implementation reducing what one interviewee described implementation as a "fly-by-the-seat-of-your-pants" experience. The plan also serves as a guide for those who manage and support the system once it is deployed. It would ensure that support and maintenance proceeds in a direction that assists the police agency in meeting its strategic goals.

Future advances in technology could have a great impact on how information systems are purchased, maintained, and how information is shared. This includes the use of hosted services where IT infrastructure is located and maintained off-site and access to CAD or RMS resources is made through a web browser. An agency's agility in adapting to changes in technology should be a consideration during strategic planning.

3.2. Strategic Justice Architecture

Any strategic planning effort at the municipal level would benefit from additional guidance at the state level where efforts are underway to develop a strategic justice architecture to connect law enforcement, courts, and corrections information systems. Since the entire justice community is likely to share many of the same challenges identified in this research, a coordinated statewide effort can have a major impact on the future success of information system implementation across the state. In particular, a strategic justice architecture may open up additional opportunities for grant funding, opportunities for state and local agencies to share information system expertise, and it would ensure that each police agency is headed in a direction that facilitates the exchange of justice information.

3.3. Collaboration and Consolidation

There are many incentives to collaborating with state justice agencies, neighboring law enforcement agencies, or other public safety organizations within a municipality. Collaborating and consolidating creates opportunities for cost reduction, streamlining processes, improving information-sharing, leveraging enterprise solutions, and leveraging fiscal and personnel resources.

According to the survey results, well over half of the state's law enforcement agencies do not pool resources with other law enforcement agencies to purchase hardware, software or to provide technical support. There appear to be many opportunities, particularly in southern Maine, to develop inter-agency solutions to the fiscal and personnel challenges identified in this research. Collaborating on inter-agency IT projects can also help identify opportunities to consolidate other shared services in IT or e-government.

3.4. Training in Police Information Systems

According to the survey results, most police information systems are managed and maintained by sworn police officers. The vast majority were trained as police officers first and have received an elementary level of technical computer training second. Rarely can a police

department afford to recruit from a highly competitive field like computer science. Therefore, there exists a need for affordable training suited to the needs of those who manage police information systems.

The training could take the form of in-service police training (in-person or virtual) sponsored by the Maine Criminal Justice Academy or as a continuing education course available through Maine's community college system. The training should be primarily focused on technical issues associated with police information system implementation but also on other challenge areas such as under-utilized functions and quality control where this research indicated deficiencies.

Additional study

This research revealed several opportunities for future study in police information systems. Additional research might examine the impacts that police information systems have had on small police department administration. For example, how have information systems changed the roles and responsibilities of police administrators and what are the effects of those changes on policing?

Some additional research should be done to determine why there is a lack of awareness of federal guidelines and standards among those managing police information systems. It would be of interest to evaluate potential causes as well as to determine if any difference in level of awareness exists between different states.

As police agencies incorporate both the state strategic justice architecture and their own local strategies into their information system planning, it would be beneficial to measure the effects of those strategies on IT budgets. Since cost reduction is one of the most desired effects, it would be prudent to examine whether those efforts live up to expectations. Time series data should be collected to measure the impact of planning efforts over time.

Appendix A

References

Compass Intelligence. (March 3, 2008). *Survey: U.S. Public Safety IT Market Expected to Grow to $21.3 Billion by 2011.* Retrieved March 3, 2008 from: http://www.govtech.com/dc/articles/268864

Hanson, Wayne. (Jan. 18, 2008). *Bloomberg Outlines Multiple Technology Programs for New York City, From Education and Social Services to Public Safety.* Retrieved January 19, 2008 from: http://www.govtech.com/gt/articles/251498

Reaves, Brian A. (June 28, 2007). Census of State and Local Law Enforcement Agencies, 2004. *Bureau of Justice Statistics Bulletin.* Issue: June 07. Retrieved on October 7, 2007 from: http://www.ojp.usdoj.gov/bjs/abstract/csllea04.htm

Maine Department of Public Safety (DPS), Uniform Crime Reporting Unit. (2006). *Crime In Maine, 2006.* Retrieved on October 20, 2007 from: http://mainegov-images.informe.org/dps/cim/crime_in_maine/2006pdf/084%20employ.pdf

U.S. Census. (2008). Maine by Place and County Subdivision. Retrieved on March 13, 2008 from: http://factfinder.census.gov/servlet/GCTTable?_bm=y&-geo_id=04000US23&-_box_head_nbr=GCT-PH1&-ds_name=DEC_2000_SF1_U&-_lang=en&-redoLog=false&-mt_name=PEP_2007_EST_GCTT1_US9&-format=ST-7&-_sse=on

U.S. Department Of Justice, National Information Exchange Model (2007). *Value of NIEM.* Retrieved on 4-12-08 from: http://www.niem.gov/pdf/ValueOfNIEM.pdf

Appendix B: Survey Instrument

Building Capacity for the Implementation of Police Information Systems

Position/Title and Name: _____

Department: _____

Municipality: _____

Number of full-time equivalent (FTE) police department personnel in your local agency: _____

1. Does your local police department utilize computerized information systems?

☐ Yes   ☐ No

1.b. Please indicate which types of information system technology your police department uses (Check all that apply).

☐ Computer Aided Dispatch (CAD)
☐ Records Management Systems (RMS)
☐ Mobile computers installed in police vehicles
☐ Hand held electronic devices (PDA's, Blackberry's, etc.)
☐ Intranets
☐ Other (please specify): _____

The next series of questions relate to how your police information system is managed.

2. Where does the organizational responsibility for day-to-day management of your municipality's police information systems reside? (Check only one).

☐ Police department
☐ Municipal IT department
☐ Collaborative effort with representatives from different municipal departments
☐ Other (please specify): _____

2.b. Are the individuals with that authority sworn law enforcement personnel?

☐ Yes
☐ No
☐ Both sworn and unsworn
☐ Don't Know

3. How many full-time equivalent employees manage or support police information systems in your municipality?

☐ 1 - 2
☐ 3 - 5
☐ More than 5

4. Among employees who manage police information systems in your municipality, please indicate how many:

	# of Employees	Don't Know
a. Have a college degree in computer science or related field		
b. Hold a professional IT certification		
c. Neither a. nor b. but have received formal training related to information systems, including vendor-specific training		
d. None of the above but have received other computer training not directly related to information systems (ex. Word processing, digital imaging)		

5. Indicate which of the following duties are assigned to individuals with responsibility for your local police information system. (Check all that apply).

☐ Oversee daily maintenance of system hardware and software
☐ Obtain and maintain contracts with hardware and software vendors
☐ Establish policies for the police information system
☐ Develop and operate training programs
☐ Develop and operate an official or unofficial help desk capability
☐ Collect and analyze data on the effectiveness of the information system
☐ Monitor/audit system for data quality
☐ Develop and maintain information sharing agreements or MOU's with other law enforcement agencies
☐ Manage user names, passwords, and access privileges
☐ Other (please specify): _____

6. Does you police department have personnel policies governing the use of police information systems?

☐ Yes   ☐ No   ☐ Don't Know

7. Does your agency comply with the following federal guidelines and tools for information exchange?

	Yes	No	Don't Know
Global Justice XML for data exchange	☐	☐	☐
National Criminal Intelligence Sharing Plan (NCISP)	☐	☐	☐
Justice Information Exchange Model (JIEM)	☐	☐	☐
National Information Exchange Model (NIEM)	☐	☐	☐
Law Enforcement Information Technology Standards Council (LEITSC) Records Management Systems (RMS) Standard	☐	☐	☐
Law Enforcement Information Technology Standards Council (LEITSC) Computer Aided Dispatch (CAD) Standard Functional Requirements	☐	☐	☐
28 Code of Federal Regulations (CFR) Part 23	☐	☐	☐
Federal Information Processing Standards (FIPS) 1/0-2 Encryption	☐	☐	☐

8. Does your municipality have an IT strategic plan?

☐ Yes   ☐ No   ☐ Don't Know

8.b. If yes, is your police information system included in your municipality's IT strategic plan?

☐ Yes   ☐ No   ☐ Don't Know

The following three questions are about your police information system budget.

9. What is the annual operating budget allocated to the acquisition, maintenance, and support of police information systems in your municipality (excluding personnel costs)?

☐ a. < $5,000
☐ b. $5,000 - $14,999
☐ c. $15,000 - $24,999
☐ d. >$25,000

10. During the last fiscal year, on average, what percentage of the police information system budget did you spend on:

Hardware: _____%
Software: _____%
Technical Support: _____%

11. Does your law enforcement agency pool resources with other law enforcement agencies in your region:

	Yes	No	Don't Know
To purchase hardware	☐	☐	☐
To purchase software	☐	☐	☐
To provide technical support	☐	☐	☐

The next questions seek to determine what organizational changes you have experienced as a result of the implementation of police information systems.

12. Has the implementation of new information systems technologies changed your local police department?

☐ Yes   ☐ No   ☐ Don't Know

12.b. If yes, what impacts have information systems had on police staff? (check all that apply).

☐ a. Has reduced the number of police staff
☐ b. Has changed the role of police staff
☐ c. Has increased demands on police staff
☐ d. Has made police operations more efficient
☐ e. Other (please specify): _____

12.c. What impacts have information systems had on IT staff? (check all that apply).

☐ a. Has reduced the number of IT staff
☐ b. Has changed the role of IT staff
☐ c. Has increased demands on IT staff
☐ d. Has made IT operations more efficient
☐ e. Other (please specify): _____

The next few questions ask you to identify challenges and successes while implementing police information systems.

13. Please indicate whether any of the following issues have been problematic in implementing technology within your police department.

	Frequent Problem	Sometimes Problematic	No Problem	Don't Know
Lack of IT staff	☐	☐	☐	☐
Personnel training	☐	☐	☐	☐
Resistance to use	☐	☐	☐	☐
Resistance to organizational change	☐	☐	☐	☐
Equipment performance	☐	☐	☐	☐
Equipment reliability	☐	☐	☐	☐
Information security	☐	☐	☐	☐
Interoperability with legacy systems	☐	☐	☐	☐
Lack of wireless broadband infrastructure in your area	☐	☐	☐	☐
Initial costs	☐	☐	☐	☐
Ongoing support costs	☐	☐	☐	☐
Vendor service	☐	☐	☐	☐
Under-utilization of information system capacity	☐	☐	☐	☐

14. Among the following, identify your level of concern about these technical issues in implementing police information systems:

	Greatest Concern		Average Concern		Least Concern
Information security	☐	☐	☐	☐	☐
Obsolescence	☐	☐	☐	☐	☐
Acquiring funding	☐	☐	☐	☐	☐
Lack of affordable training	☐	☐	☐	☐	☐
Need for IT specialists	☐	☐	☐	☐	☐
Regulatory compliance	☐	☐	☐	☐	☐
E-discovery, Freedom of Access requests	☐	☐	☐	☐	☐
Lack of broadband infrastructure	☐	☐	☐	☐	☐
Continuity of operations in an emergency/disaster	☐	☐	☐	☐	☐

Technology integration with courts, corrections ☐ ☐ ☐ ☐ ☐

15. What is the greatest technological challenge your police department faces in the next 3 - 5 years?

16. During your most recent implementation of a police information system, what factors were most important to its successful implementation?

17. Provide any additional comments related to police information systems:

If you would like a copy of the final research report, please indicate below.
    ☐ Yes, I would like a copy of the final research report.

Thank you for completing the survey.

Appendix C

Glossary of Terms

Federal Information Processing Standards (FIPS) 140-2 Encryption – Developed by the National Institute of Standards and Technology (NIST), FIPS 140-2 has become the cryptographic standard for sensitive government applications. FMI: http://csrc.nist.gov/

Global Justice XML (JXDM) - XML is a type of computer language designed to transmit both data and the meaning of the data. JXDM includes a common vocabulary for the justice field which facilitates information sharing. FMI: http://www.it.ojp.gov/topic.jsp?topic_id=43

Justice Information Exchange Model (JIEM) - Developed by the Bureau of Justice Assistance, U.S. Department of Justice, and SEARCH, JIEM helps jurisdictions interested in sharing data to document their business information sharing requirements and model solutions for information exchange. FMI: http://www.search.org/programs/info/jiem.asp

Law Enforcement Information Technology Standards Council (LEITSC) Records Management Systems (RMS) Standard - designed to inform law enforcement about the basic functional requirements that all RMS systems should have in order to achieve interoperability. FMI: http://www.leitsc.org/

Law Enforcement Information Technology Standards Council (LEITSC) Computer Aided Dispatch (CAD) Standard - designed to inform law enforcement about the basic functional requirements that all CAD systems should have in order to achieve interoperability. FMI: http://www.leitsc.org/

National Criminal Intelligence Sharing Plan (NCISP) – an information sharing initiative designed to link together all levels of law enforcement personnel, including officers on the streets, intelligence analysts, unit commanders, and police executives for the purpose of sharing critical data.

National Information Exchange Model (NIEM) – an information sharing initiative that develops standards for information exchange across federal, state, local, and tribal justice agencies and other homeland security enterprises. NIEM also provides training and technical support for users and developers.

Strategic Architecture – a framework for organizing IT infrastructure with an emphasis on developing what that infrastructure *should be* to meet the organization's strategic goals.

28 Code of Federal Regulations (CFR) Part 23 – a guideline that sets standards for the exchange of criminal intelligence information while protecting individual and privacy rights.