Applying Computer Mapping Technology to the Victoria Police Department

By

Robert D. Gehl

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We accept this thesis as conforming to the required standard

Project Sponsor, Paul A. Battershill, BSc
Chief of Police, Victoria Police Department

Faculty Supervisor, Elizabeth Cull, MA

Committee Chair, Gerry Nixon, PhD

Royal Roads University

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CHAPTER ONE – STUDY BACKGROUND

The Problem/Opportunity

The research question for this project is:

> What are the requirements to successfully integrate a computer mapping application with the information management systems of the Victoria Police Department?

In 1996, the Victoria Police Department approved the formation of a Crime Analysis Section. The role of the Crime Analysis Section is to extract, compile, and analyze the data from incidents collected by the members of the department. The processed information is then disseminated to the various sections and members of the police department. The researcher is an analyst working in the Crime Analysis Section. In establishing a Crime Analysis Section, the most significant challenge for the researcher was finding a process to assist in the analysis of large amounts of data, to provide timely information to the police officers working in the field.

Twenty-four hours per day police officers collect information. This ongoing collection process results in the compilation of significant amounts of data regarding the incidents police attend. In the last decade, many police agencies have acquired computer-assisted records management systems (RMS) and computer aided dispatch (CAD) systems to assist in the collection, collation and dissemination of data. The systems provide the ability to store and access incident information in an electronic format that is available on any computer workstation within the police facility. While the implementation of RMS and

CAD have improved the storage and management of information, the current systems do not effectively meet the needs of police officers who need access to the stored information to perform their duties.

One difficulty with accessing data from the current information system is experienced by police officers returning from leave. After an absence, an officer may spend a great deal of time reviewing text based reports on the areas where auto, property, or other crime type incidents occurred during their absence. Similarly, officers seeking detailed information about a specific crime type may have to search through many hard copy reports or view multiple screens of text based computer data before they find the information needed to analyze where particular incidents are occurring. One potential solution identified to improve the ability of officers to meet their need to access information is the use of computer mapping software.

In contrast to spending hours scanning through text-based reports, using a geographical format on a computer to view the stored information provides the officers with a visual snapshot allowing them to analyze incidents spatially. For example, plotting the locations of auto crimes on a computer-generated map allows an officer to rapidly identify patterns or hot spot areas where high incidents of crimes are occurring. The Victoria Police Department Crime Analysis Section uses MapInfo computer mapping software as a means to plot and analyze a variety of crime types for distribution to the police department members. Police officers receive weekly reports consisting of maps showing the

locations of specific incident types including auto crime, break and enter, and other offences.

Over the last two years, the Crime Analysis Section has received affirming comments from department members indicating that the mapped information affords a quick and efficient means of determining where their routine patrols should be concentrated. In addition, a further benefit noted by the members is a reduction in the amount of time needed to identify crime trends when using spatially represented computer maps instead of the conventional text based reports.

The benefits of computer mapping are not limited to front line officers. Access to mapped information is also essential for meeting the needs of officers investigating a specific incident. With computer mapping, the Crime Analysis Section currently provides mapped information that allows investigators to spatially compare and analyze the characteristics of similar incidents to determine if there is a relationship between the events. As an illustration, investigators may request the Crime Analysis Section to query burglaries based upon occurrence time, method of entry, and property taken. The mapped query results could identify suspect patterns and indicate potential premise locations the suspect may target in the future. For an investigator, the ability to identify suspect patterns has the potential value of assisting in suspect apprehension and identifying links between the perpetrator and previous crimes.

Similar to front line officers and detectives, police supervisors as well as senior managers use computer-mapping information for a number of purposes.

Two of these purposes are resource allocation and long term planning. For example, by observing the spatial representation of incidents on a computer map, the patrol supervisor can determine whether a particular area of the city requires extra resources at certain times of day. As another example, senior managers may use mapped information to assist with long term planning strategies. For instance, by analyzing monthly calls for service plotted on a computer map, managers may determine if the existing allocation of resources effectively meets the department's commitment to efficiently deliver service to the citizens of Victoria.

Although using computer maps has significantly enhanced the ability to access and disseminate the information housed in the department's computer systems, a limitation in the process is having to use a specialized unit, the Crime Analysis Section, to provide the mapped information. As a result of the increased demand for mapped information, the Crime Analysis Section cannot always meet the requests of police officers in a timely manner. At present, two police officers and one civilian member are trained in the use of computer mapping software and are responsible for distributing the mapped information to the department members.

Unfortunately, the mapping software currently used in the department is complex and requires intensive training for proficiency. With this in mind, the next logical step is to develop a user-friendly computer mapping application with minimal training requirements for use by department members. The rationale for developing this type of application is consistent with the metaphor "Give a

man a fish and you feed him for a day; teach him how to fish and you feed him for a lifetime" (as cited in Covey 1992, p.14). In other words, rather than having one or two people provide information for many members, a user-friendly application will allow members to access the information themselves.

The proposed "user accessed" computer mapping application will interface to the automated information management systems currently used by the Victoria Police Department. When implemented, the proposed application will display specific incident types in a mapped format based on user defined date and time ranges. In addition to the mapped display, the application will provide details of each incident record in a text-based format. Taking advantage of the latest software program technology, the proposed mapping application will provide user-friendly functionality that is anticipated to reduce training time, and in turn increase the user's confidence in accessing information from the existing systems.

When planning for new technology it is important to involve the end-user in the planning process since the successful integration of an application often depends on user support. In order to gain this support, it is essential that the users become active participants in the development and integration processes. There are four areas in the development and planning process of implementing a computer mapping application where user participation is essential. First, the users should determine the viability of integrating a computer mapping application to current information systems. Second, the users must participate in defining how the proposed mapping application will meet their operational

needs. Third, it is necessary to include the users in the process of defining and developing the training requirements for the application. Finally, once the application is in place, ongoing user consultation is necessary to determine the areas requiring improvement.

In developing an understanding of the various information needs of the department, it is important to have an understanding of the organizational structure of the department and how the various sections might use the gathered data. The following section of this chapter will outline the organizational chart of the department and briefly discuss the external agencies that are participants in the process to develop the proposed mapping application.

The Organization

The Victoria Police Department is an organization consisting of approximately 187 sworn police officers and 77 civilian support staff. The organizational structure of the department consists of two general bureaus, operations, and support services. The Bureau of Operations includes the Detective, Patrol, Community Policing, and Traffic Divisions. The Bureau of Support Services includes specialized sections that support the operational divisions. These resources include Forensic Identification, Information Technology, and Crime Analysis Sections (see appendix a).

As indicated on the organizational chart, within the Bureau of Operations (appendix a), there are approximately 150 police officers that rely on the departments automated information systems to perform their duties.

Approximately 90 of these officers work in the Patrol Division performing general investigative duties. These general duty officers are the first response units for calls received by the department. The members of the Patrol Division form four patrol watches that provide police service 24 hours per day. These watches work on a 12 hour shift pattern consisting of two day shifts then two night shifts followed by four days of leave.

The Traffic Division is primarily responsible for providing traffic-related enforcement and motor vehicle accident investigation. Bicycle officers in this division provide directed patrols in the downtown area of the city. The Detective Division is responsible for crime investigations, which may be more complex and require significant amounts of time to investigate. The Community Policing Division (CPD) is responsible for community based programs delivered through a collaboration of police officers and community volunteers. Programs delivered through CPD include Drug and Alcohol Resistance Education (DARE), Auto Crime Prevention, and Neighbourhood Block Watch.

Throughout the organization, the police officers working in the various divisions share the common bond of requiring information to carry out their duties. The Information Technology (IT) Section is responsible for the implementation, maintenance and technical support of the information network for the Victoria Police Department that provides this needed data. Other participants responsible for providing information to the members of the department are the Communications and Records Sections. The civilian staff members of these sections are responsible for collating, entering and maintaining

the information collected by the operational police officers. Within the department, the information network consists of approximately 100 computer workstations in the police building, computer workstations in two community police stations, and approximately 25 mobile computer workstations in the police vehicles (see appendix b).

In addition to providing support service to the Crime Analysis Section, the three person Information Technology Section staff are essential participants in the development process of the proposed mapping application. The systems analysts in the IT section will be responsible for writing the programs needed to extract the information from the existing information management system for use in the computer mapping program. As well, this section will be responsible for integrating the mapping program into the existing computer network of the department.

Several external agencies and city departments are also important contributors and participants in the proposed mapping application project. Most notably, the Insurance Corporation of British Columbia (ICBC) – Auto Crime Strategies Section, is providing a grant of approximately sixty-three thousand dollars toward the development and implementation of the proposed computer mapping application. Members of the Auto Crime Strategies section participated in the selection of a vendor to design the computer program for the Victoria Police Department.

Two City of Victoria departments have also been instrumental in developing this project. The Engineering Information Services Section provides

essential address information used for mapping by the Crime Analysis Section of the police department. This address information is a critical component in the development of the proposed computer mapping application. The second City of Victoria department supporting the project is the Supply Management Department. This department is responsible for assisting in the development of the request for proposal, the tender process, and the evaluation of vendor proposals to design the proposed computer-mapping program.

In conclusion, to effectively meet the information needs of the members of the Victoria Police Department, it is necessary to take advantage of new technologies that will augment the current methods of accessing data. One anticipates that the development and implementation of a "user accessed" computer mapping application will complement the current methods of information access used by the department by providing timely and efficient access to the data stored in the department's computer information banks.

Before beginning to implement technology change, consultation with the end-user is necessary. Without enlisting user participation in determining the viability, functionality and training requirements of the proposed application, successful integration of the final product is minimized. Therefore, it is essential that the end users of the proposed mapping application participate in the development, integration, and training phases of the project.

Although the end-users of the proposed computer mapping application may be considered pivotal to the implementation of new technology, as the organizational information demonstrates, many stakeholders who are not

necessarily members of the police department are essential to the project development. If one overlooks consideration of these external agencies, there may be no project to implement in the first place. For example, without the funding grant from ICBC, the project would not have the financing needed to proceed. With this concept in mind, it is important at the beginning of project development to move outside the primary agency, in this instance the Victoria Police Department; to consult with representatives from each of the agencies involved.

The project deliverable for this report is a request for proposal (RFP) to design a computer mapping software application. The following chapters of this report will discuss the requirements to integrate the computer mapping application, to the stage of request for proposal, to the information management systems of the Victoria Police Department.

CHAPTER TWO – LITERATURE REVIEW

Planning to design and implement new technology within an organization requires groundwork. A review of the organization's philosophy, goals, and strategic objectives is an important aspect of this preparation. Another essential component of implementing a project, is a review of the current literature pertaining to the application. This chapter discusses two literature review components. First, a review of the organization's documentation, and second, an examination of literature discussing computer mapping, technology applications in policing, and finally considerations for organizational change within a police agency.

Review of Organization Documents

The Victoria Police Department mission statement expresses that:

> The Victoria Police Department, in accordance with the *Canadian Charter of Rights and Freedoms* and in partnership with the community is dedicated to maintaining peace, order and public security and for preventing crime, thereby creating a safe and harmonious community. (Victoria Police Department, 1997a)

The statement is consistent with the general philosophy of policing that espouses the protection of life and property. More recently, policing has recognized the importance of community participation; therefore, collaboration with various community agencies has become a priority for police organizations. Ideas around the concept of collaboration will be developed later in this discussion.

Over the last decade, the Victoria Police Department (VPD) has introduced a number of new computer technologies. The department's commitment to seek new and innovative methods of improving service delivery is illustrated in the general goals of the Victoria Police Department Strategic Plan (Victoria Police Department, 1997b). One of the goals included in the strategic plan pertains to technology and is listed as follows,

> To enhance the Department's efficiency, and to be in a position to respond to the emerging policing needs of the City of Victoria by continuing the process of planning and research needed to:
>
> i) identify and acquire up-to-date technology and equipment
> ii) make necessary operational and deployment improvements
> iii) provide essential training and technical support. (p. 7)

Because of this goal, a number of new technologies were implemented in the department. These include, digital photography systems (prisoner booking management system), mobile data terminals (computers in the police vehicles), and upgraded computer workstations within the police facility. These initiatives have helped the department meet the objectives of improving efficiency, and responding to emerging policing needs. As Lowenthal (1994) explains, "permanent adjustment is required. If an organization does not respond it will fall behind" (p. 17). Recognizing the importance of innovation and permanent adjustment, through its strategic planning, the Victoria Police Department moves beyond dialogue to the active pursuit of innovation.

In times of fiscal restraint, many agencies including policing have come to value the benefits of collaboration. This project exemplifies a collaborative

partnership between two agencies – that of the Insurance Corporation of British Columbia (ICBC), and the Victoria Police Department. ICBC, in accordance with its mandate to reduce auto theft and auto crime, has developed a grant program to provide funding for agencies developing auto crime reduction initiatives. In the documentation for the Auto Crime Prevention Grant Program, ICBC (1998) promotes a philosophy that echoes the mission statement of the Victoria Police Department. The ICBC documentation explains,

> We know that we cannot solve the auto crime problem alone. We recognize that community stakeholders have good ideas for crime prevention and we are committed to helping them...The ICBC Auto Crime Prevention Grant is designed to support auto crime prevention projects planned by expert groups in the community for the community". (p. 3)

The B.C. Ministry of Health, an agency with significant experience and knowledge of change processes, believes that when working with other agencies, one has the opportunity to reflect on the projects of others and to ask, "What are they doing? How is it going? Which strategies are effective? Could we collaborate?" (Ministry of Health, 1994, p. 17). When agencies choose to work in supportive collaborative relationships, they benefit by building on the knowledge and expertise that each agency already holds.

The relationship between the Victoria Police Department Crime Analysis Section and The City of Victoria Engineering Department, is an example of another collaborative partnership that benefits the Victoria Police Department. The vision statement of the Engineering Department "excellence in information sharing" (City of Victoria, 1998, p. 6) is similar to the one of the strategic goals of the Victoria Police Department. Both departments share a dedication to provide

current and accurate information that assists others to effectively use information. By providing the Crime Analysis Section with address information files for the City of Victoria, the Engineering Department was instrumental to the initial implementation of computer mapping for the Victoria Police Department. As this example illustrates, inter-agency collaboration and co-operation are often essential, and at times neglected, components of developing new programs.

With the new addition of technology, there is a need to provide training. As the goal of meeting emerging police needs indicates, training is important when instituting new initiatives. However, the fiscal implications of training when implementing technology require consideration. At times, when introducing new technology, the need for training disrupts the daily operations of the department. One must then consider whether the long-term benefits of the technology outweigh the short-term disruption of efficiency during the training and implementation phase. To evaluate this process one requires measurement indicators that reflect the objectives of the project. To date, these measurement indicators are not present in the organizational documentation of the police department. However, the City of Victoria is currently addressing this issue through an initiative to develop corporate performance measurement indicators.

Review of Supporting Literature

To address the research question concerning the requirements to successfully integrate a computer mapping application for the Victoria Police Department, supporting literature surrounding three theme areas will be

discussed. First, it is important to understand the origins of mapping, its evolution to the computer age, and its applications for policing. Second, discussion of information technology for policing and its implications are examined. Finally, there is discussion pertaining to considerations for change with respect to introducing new technology to a police organization.

The Evolution of Mapping Technology and Police Applications

Geographic Information System (GIS) technology, otherwise known as computer mapping, is a relatively new science. The use of computer mapping in police organizations could be described as being in its infancy with respect to development. As a new science, the literature available regarding computer mapping technology and its applications for policing is somewhat limited in scope. However, the last ten years have demonstrated an increase in the literature written pertaining to computer mapping and law enforcement.

This component of the literature review will assist in elucidating an understanding of the evolution and application of computer mapping to policing. Using a historical timeline, this literature review will trace the development of mapping, spatial analysis, and computer mapping, from the early 1800s to the present day.

Mapping in the 1800s

The use of maps to interpret and analyze information dates back to the early 1800s in France. Weisburd and McEwen (1997) discuss the use of mapping by a physician to plot outbreaks of Cholera, relative to sources of drinking water.

Using a manual mapping process, the physician was able to compare the two disparate data types, water pumps and disease. The map provided a spatial reference and provided the physician with valuable information toward identifying a problem.

> Drawing from a theory that contaminated water causes cholera, he also marked the locations of the area's 11 water pumps. He analyzed the scatter of dots on the map and noticed that they concentrated near the pump on Broad Street...Dr. Snow had the handle of the Broad Street pump removed, and the cholera epidemic came to an abrupt halt after having taken more than 500 lives. (Weisburd & McEwen, 1997, p.3)

In another example, Weisburd and McEwen (1997) describe an incident of early crime mapping. Applying France's census data from the years 1825 to 1827 Balbi, an ethnographer, and Guerry, a lawyer, developed maps of crime areas in relation to violence and property crime types. The maps incorporated the data of criminal statistics and demographic information. As Weisburd and McEwen elaborate,

> Comparing these maps, they found that the north-eastern portion of France...was better educated, that areas with high levels of crimes against property had low incidences of attacks on people, and that the areas with more property crime were populated by people with higher levels of education. (p. 5)

Thus, the spatial comparison indicated an inverse relationship between areas of violent crime and the education level of the resident population.

The use of mapping during this period required significant amounts of time to manually collect the data and prepare the maps. As such, a waning of interest in mapping occurred in the late 1800s. Weisburd and McEwen state:

> there was also a very practical reason for moving away from the use of maps and regional variations in social and moral

> statistics...maps of interest could not be developed on any regular basis; crime theories were not adequately developed; and techniques for analysis were slow, time-consuming and cumbersome. (p. 7)

Mapping and Technology in the Early 1900s

A resurgence of mapping in North America began in the 1920s in urban areas. The primary functions for mapping information focussed on urban planning for city centers in their developmental stages. Mapping crime information focussed on the crimes and social problems associated with urban centers. For example, Thrasher, a sociologist, plotted the locations of active gang members. The spatial representation revealed that gang members often resided in areas of Chicago where "social control was weak and social disorganization was pervasive" (as cited in Weisburd & McEwen, 1997, p. 8).

While the historical use of information mapping to provide a method of analyzing and interpreting data in a spatial format stimulated the interest of sociologists, "the tedious and difficult process of mapping crime in the pre-computer age did not appear to offer potential for new and important insights" (Weisburd & McEwen, 1997, p.8) that police agencies of the day could readily apply to meet operational needs. With the advent of the computer age, the concept of producing computer generated maps occurred in the late 1960s. Carnaghi and McEwen, (as cited in Wesiburd & McEwen, 1997) discuss the use of computer generated maps to provide visual representations of specific crime trends. Although the discussion of this new technology centers on the ability to provide a visual representation of crime locations, and the ability to deploy

resources effectively, it fails to illustrate the difficulties associated with distributing the mapped information.

Some of these difficulties include computer hardware limitations, mapping software complexities, and the human resources required to produce the mapped information. During this period, the dissemination of information to the stakeholders was difficult due to the technical considerations involved with computer mapping. For example, a large mainframe computer system was necessary to produce the final product. Consequently, many of the smaller police departments found the computer equipment and human resource requirement cost prohibitive. With the advent of personal computers, a significant reduction in the size and cost of computer hardware occurred. Because of this cost saving, many organizations, including law enforcement, were afforded the ability to purchase computer-mapping technology.

Applications for Computer Mapping Technology

The benefits of computer mapping, or GIS technology, are not limited to policing. Rogers and Craig (1994) provide the following example:

> Geographic information systems have been used in a wide range of fields: wildlife biologists use them to maintain inventories of rare and endangered species and to better understand their natural habitats; agronomists use them for estimating crop yields; environmentalists use them to study pollution and to select and monitor hazardous waste sites; geologists use them to explore mineral deposits; meteorologists use them to study climatic conditions (long term changes in temperature and precipitation); soil conservationists use them to monitor aquifers and floodplains; archaeologists make use of them to excavate archaeological sites; architects and civil engineers employ them for site selections and environmental impact statements; foresters use them for logging and reclamation projects, government officials use them for

> planning and maintaining the infrastructure (transportation networks, utility corridors, etc.); city planners use them for a plethora of clerical and administrative tasks (the maintenance of public records of land ownership, mining claims, rights-of-way, zoning restrictions, voter registration, automated tax assessment, routing of emergency vehicles, the maintenance of transportation facilities and public lands, etc.). (p. 71)

It is apparent that the advancements in computer mapping technology will allow more organizations to use this technology in their current information management systems.

Computer Mapping for Law Enforcement

One of the earliest methods employed in policing to spatially display crime incidents was to plot the crime data on a paper copy map using pushpins. Using computer mapping technology has advanced this process to a type of mapping defined, by McEwen and Taxman (1995), as descriptive mapping – a process that applies the same principles as a pin map in an electronic format. In their categorization of the types of computer mapping, as applied the police environment, McEwen and Taxman suggest that descriptive mapping provide the greatest benefit to a police organization. The use of a computer reduces the human intervention necessary to create a map of the data, enhancing the ability to collect, compile, analyze, and disseminate information.

Currently, the use of a community-policing model that incorporates the community as an active participant in the problem solving process requires police organizations to have a means of identifying crime problems within a community. Block and Green (1994) discuss the advances in computer crime

mapping and the ability to analyze data spatially as arriving "at a propitious time" (p. 1). However, one must question whether the technology advanced to a point where it became practicable for policing needs, or rather, if police organizations finally recognized the benefits of an existing technology. The most likely explanation is that police organizations have come to recognize the benefits of an existing technology, which has recently become an affordable investigative tool.

Computer mapping in the police setting is used to provide information to several client bases. First, in the area of resource deployment, the mapped information allows police managers and administrators to see a visual representation of where and when resource deployment occurs within a geographical boundary. Second, detectives can use computer mapping as an investigative tool. For example, a detective investigating a series of robberies with similar characteristics may gain a new perspective by mapping and studying the specific incidents from a spatial perspective. By mapping the information, the investigator may discover that the suspect chooses locations, which are close to public transportation areas therefore assisting in egress from the crime scene. Finally, police officers conducting routine patrol functions will benefit from the use of mapped information. For instance, by providing police officers with a map of recent auto crimes, such as those occurring in the last 24 hours, one could direct attention and patrols to the targeted areas.

Future Trends for Computer Mapping and Policing

To enhance the opportunities provided by mapped information, the end users require access to the information. At this time, there is a shift from specialized crime analysis units providing the computer maps, to the end user obtaining the information on their own. According to Rich (1995), user expertise may be offset with the development of customized mapping software applications that require minimal training to use.

The issues surrounding the ability of the user to access the mapping application requires consideration. For example, advancements in mapping technology provide economical user-friendly software, which increases the opportunity for the end user to independently obtain the necessary information. Similarly, Mamalian and LaVigne, (1999, p.3) discuss a recent survey of law enforcement agencies using mapped information provided by the crime analysis units. Information drawn from the sample group indicates that 61% of the respondents support the usefulness of developing end-user software that requires minimal training. Based on the researcher's experience as a crime analyst, and the survey results of Mamalian and LaVigne, a logical advancement in computer mapping technology is the development of software whereby the user accesses and creates the necessary mapped information independent of the specialists who currently provide the maps.

Today, a number of police agencies in North America are developing custom computer mapping applications to allow any member of the organization to access information from the computer mapping program. Rich (1995)

describes how the Chicago Police Department has developed the Information Collection for Automated Mapping (ICAM) program. Essentially, the program is a "walk up and use" (p. 5) application, requiring minimal training or expertise from the user in order operate the program.

Since the inception of the ICAM program, the Chicago Police Department has recognized new and innovative uses for the mapped information. For instance, in addition to providing information to the officers within the department, members of the public may avail themselves to selected types of information concerning issues within the community. The program serves as an excellent model of the benefits afforded using computer-mapping technology. The Chicago Police Department demonstrates forward thinking in recognizing the limitations of current technology and taking the necessary steps to develop their own custom mapping program. This process validates the organization's commitment to meeting the needs of the officers within the organization, and to the communities they serve.

In conclusion, as this literature review discusses, while computer mapping is an emerging science, it certainly provides the foundation for exciting technological advances in many fields including that of policing. The historical representation of the use of mapping to facilitate the visual representation of problem areas provides the precursor for today's use of mapping. With the advent of the computer, this technology became more readily available for use in determining crime trends and problem identification.

In the last two hundred years mapping has evolved from paper copy to computer generated products. In the last sixty years, the technology has evolved resulting in a shift from large cost-prohibitive mainframe computers to compact economical laptop personal computers. The evolution of computer hardware provides greater information accessibility for policing. For example, the laptop computer is being used for mobile data access and reporting by police departments throughout North America. Similarly, computer software and programming advancements have improved technology functionality, and reduced complexity in training. With this in mind, the future of crime mapping rests in the development of software that allows the end user to easily access the geographical information within the mapping applications without the aid of experts who specialize in the field of computer generated mapping.

Information Technology and Policing

Information is an important facet of policing. In today's high technology environments, the tools needed to manage the vast amounts of data collected are present in varying degrees of sophistication in every police organization. Similar to other private and public sector organizations, policing has become dependent on automated information management. As a result, extensive information technology applications are available for use in the law enforcement arena. This section of the literature review will examine some of the benefits and limitations of using information technology in policing.

Information is critical to the optimal functioning of any police organization. Police agencies collect information twenty-four hours a day and

similar to a clearinghouse this information is stored in various formats throughout the department. As Manning, (1992) describes, "information is a critical feature of modern societies and is the essential and central feature of policing" (p. 352). The information central to police work relates to data collected about people and events. Specifically, the information collected includes, but is not limited to, personal data, circumstances surrounding an incident, as well as property, vehicle, and location details. On a daily basis police agencies gather large amounts of data on these entities. In turn, this information is used when responding to calls and in ongoing development of organizational and community objectives. Thus, similar to many other organizations, police departments have come to rely on automated information systems to store, collate, and disseminate the vast amounts of data collected.

Traditionally, information management for policing involved a combination of officer knowledge and experience, coupled with hard copy reports as well as the officer's personal notebook entries. In describing the limitations of using individual memory and hard copy storage of collected information, Manning (1992) comments that,

> Information in police departments can be best characterized as systematically decentralized. Often, primary data known to one officer are not available to other officers because of the personalized practices of data storage. Most of the information that exists in policing is primary data possessed by aggregated records or the information stored mentally by an officer. (p. 370)

The use of automated information systems tackles the decentralization inherent in traditional police information management. By storing information in a common location, automated information management systems allow many

people to access the system with an ability to contribute or view data. The following example of police practice illustrates the importance of automated information storage and retrieval. As an example, when a police officer pulls over a car for a speeding violation, by querying the vehicle on the automated system, the stored information may indicate that the vehicle was involved in a recent robbery. If an automated system is not used, then availability of this information may be limited to a select number of officers. Thus, the ability of officers to access automated information has benefits from investigative and safety perspectives.

Over the last two decades, the majority of police departments in Canada have incorporated technology to assist in information management. The implementation of technology ranges from a single personal computer, to large computer networks capable of supporting computer aided dispatch (CAD) and records management systems for multiple police departments in a region. As evidence of this national application of technology, every police department in Canada uses the Canadian Police Information Centre (CPIC). CPIC is an automated information system that allows agencies to access and contribute essential information on various categories including missing persons, warrants for arrest, and stolen vehicles.

One could suggest that the advances in information technology have increased efficiency within the police organization. However, while there is potential for increased efficiency with technological advances, there needs to be as Minoli (1995) describes the "effective application of technologies" (p. 2). In

other words, it is not enough to give someone a computer without providing the training and requisite knowledge needed to employ the technology. Within police agencies, an essential component of managing information is the issue of quality control for data entry. For instance, technology use may hinder police productivity if critical information is excluded in the data entry process or if data entry is not completed in a timely manner. On the other hand, again quoting Minoli (1995), if the technology "provides the equivalent of an 'enterprise on the desk,' giving employees easy access to the information they have a need and a right to use in order to work more effectively" (p. 2), then the potential for increased efficiency within the police organization exists.

The use of technology to support information management is evolving from supporting a single police department to a broader perspective of information support for multiple police agencies. Currently, most single police agencies do not have the technology to allow information sharing, other than CPIC capabilities, through a global network accessible by other agencies. The British Columbia Association of Police Chiefs recognized this need and provided the following vision statement: "Adopt a common police information system in British Columbia which is focused on supporting operational police officers and the delivery of community policing." (E-COMM, 1998, p. 1). In response to this vision statement, an automated information system project is underway in British Columbia that will link all police agencies within the province to a shared records management system.

While there are a number of national police information systems in place in North America today, the information provided through these systems is limited due in part to older system design. In older system designs, some of the limitations include the inability to access or contribute specific details and circumstances. In addition, older system architecture does not allow incorporation of newer technology advances such as digital imaging and geographical information systems. The financial costs associated with keeping abreast of technology advancements are a deterrent for many police agencies. Swann (1998) describes the issues faced in planning technology use in this ever-evolving environment:

> As the pace of technological change continues unabated, and product life cycles become shorter, many businesses are having to plan within ever shortening time horizons. A major issue for the management of technology in the future is how to ensure that shortening business horizons do not deter important long-term strategic investments in new technologies. (p. 108)

The open architectural standards provided with newer technology will have greater capacity for ongoing improvements and system additions thus overcoming some of the limitations inherent in rapid technological change.

Recent advances in information technology have improved functionality and user friendly applications. Standardized computer program languages and software operating systems provide the user with reduced training time. "There has been an almost universal movement toward graphical user interfaces (GUIs) as the most effective method for presenting information to people. This windowing environment allows the client system (and the user) to support several simultaneous sessions" (Minoli, 1995, p.33). Similar to the use of images

in mapping, a graphical user interface provides the user with a series of icons to manipulate information within a program. Most personal computer users are familiar with graphical user interfaces since these are the icons present on the computer desktop indicating Windows based programs. Similar to opening a file folder, a graphical user interface allows the user to run more than one program or application simultaneously. Older system technology was incapable of allowing this multi-tasking functionality.

A further technological advancement that has profound implications for automated information management systems is the addition of communication through visual images. The use of images, through a medium such as computer mapping, provides further enhancement of information communications. Raymond (1994) expands the idea of image as communication in the following description:

> Images reduce our dependence on words for communication. They are a direct means of communicating that don't require listening skills, language skills, or patience. They confront the viewer with a great deal of information at the same time. The viewer can choose where to focus, the sequence and length of concentration on different aspects of the message. (p. 71)

Mapping applications enhance the user's ability to interpret information by displaying the information in a visual language. Raymond believes that visual language removes the need for traditional listening and language skills. One would argue that rather than eliminating the need for listening and language skills as suggested by Raymond, instead visual language serves to enhance the interpretive capabilities of the technology user. For example, the user must understand what the displayed images mean. In a mapping scenario, the user

would need to understand the meaning represented in a cluster of symbols depicted on the map. Thus, similar to interpretation of written language, one must develop the visual language skills needed to interpret the mapped information.

Information technology has the ability to improve productivity and efficiency within police organizations. Present technology enhancements in the form of geographical user interfaces and visual language signal the future use of information management for policing. As Guns (1996) states, "if information is the raw material of the knowledge worked, then leveraging information is a basic skill of the knowledge worker" (p. 104). The ability of police agencies to incorporate current relevant information technology into their organizations will provide the lever necessary for the users to access and benefit from automated information management systems.

Considerations for Organizational Change

> As society becomes more complex and technologically dependent so must every police agency if it is to have a successful transition into the 21st century. These societal complexities and technological advancements (working environment and competitiveness, demographics, fiscal dynamics, automation) and the impact and challenge associated with each will have a profound effect on the law enforcement profession. (Thies, 1991, p.2)

Since the literature and information available on the topic of change is extensive and the scope of this literature review can only briefly examine the process of change, this portion of the discussion focuses on understanding the change process when introducing new technology in police organizations. The discussion will examine ideas related to three facets of change, preparing for change,

facilitating change, and barriers to change. Finally, the discussion will explore influencing change in a paramilitary organization with a hierarchical leadership structure.

Preparing an organization for the change of existing technology or the addition of new technology requires significant groundwork. Before deciding to introduce new technology, one must first consult with the members of the organization to determine the actual versus the perceived needs of the organization. In addition, an effective consultation process allows for open and meaningful discussion that values the ideas and opinions of the people in the organization. As Nyswander explains

> the change agent who begins with the individual's or the community's felt needs and concerns rather than with a personal or agency agenda will be far more likely to experience success in the change process than if he or she were to impose an agenda from the outside. (as cited in Minkler, 1990, p. 270).

Inclusion of the members of the organization should occur at the early stages of planning, allowing for frank discussion on the benefits and liabilities of the proposed technology.

Unfortunately, when introducing change, many organizations omit the necessary step of member consultation. As the Ministry of Health describes, many "excellent programs often flounder because: They are not accepted by the people they're intended to serve" (British Columbia Ministry of Health, 1994, p.7). Consultation with members of the organization provides collateral benefits. For instance, as Yukl (1998) explains "more participation is likely if you present a proposal as tentative and encourage people to improve upon it, rather than

asking people to react to an elaborate plan that appears complete" (p.223). Allowing people to participate in planning generates a feeling of project ownership and interest.

In addition, bringing community members together increases their understanding of the processes or limitations present in other areas of the organization. A benefit to one area, may in fact be a limitation to another area. Group dialogue identifies these previously unrecognized benefits or limitations and the ensuing discussion enriches the development process. Yukl (1998) expands this concept and states that "participants are more likely to understand and accept the decision if the decision process allows sufficient opportunity to present ideas and influence the outcome" (p. 498). It is important to note that a participative process only works in police organizations when the issue does not relate to an emergent situation. In the cases of emergent situations, it is desirable and necessary to have a clearly defined chain of command for decision making.

The role of management in any episode of organizational change is pivotal to its success. A risk inherent in the hierarchical management structure of a police organization is that the members of the organization are not consulted about impending changes. In other words, the agency managers, used to leading in a hierarchical pattern, may make decisions in isolation from the organizational culture. As Senge (1990) describes, "sometimes, managers expect shared visions to emerge from a firm's strategic planning process. But for all the same reasons that most "top-down" visioning processes fail, most strategic

planning also fails to nurture genuine vision" (p. 214). In the hierarchical structure of a police department, managers possess the power to initiate change without the participation of the members of the organization. Yet, police managers must now recognize that:

> Leadership development is a key aspect of developing competent communities. In particular, the development of leaders able to fulfil the roles of animator (stimulating people to think critically and to identify problems and new solutions) and facilitator (providing a process through which the group can discuss its own content in the most productive possible way) is key to building group competence and effectiveness". (Minkler, p. 269)

Today, many police managers strive to include the members of the organization in the decision-making processes. This is especially true of technology related projects since many of these managers may not have the expertise base needed to make informed decisions. To enact their autocratic privilege in planning a technology-based change would be detrimental to the change process.

In addition to community involvement, an essential component of avoiding project failure, is to develop a project plan. As the British Columbia Ministry of Health (1994) describes, "having set out your goals and strategies, you can work out the logistics of how, with the (organizational) community, you'll carry out the strategies or objectives, and achieve your goals" (p. 23). In preparation for an organizational change in technology, a well-defined project plan is essential to effective program management. "Project management (execution) was rated as the most important area contributing to project failure in cases with both serious budget and schedule overruns" (KPMG, 1997, p.17).

One would argue that, despite the importance of fiscal and timing concerns, the human resource considerations are primary to the successful implementation of technology programs. As described by Kline and Saunders (1993):

> As they've moved towards a high tech environment, all too many companies have completely ignored the other half of the necessary balance. They've ignored high touch. But the human factor must be dealt with as effectively as the systems, the machines, the accounts and the strategic plans. Overlooking the human factor is bound to be the costliest mistake any organization can make. (p. 25)

As such, project plans need to reflect needs of the people affected by the change.

When moving from the planning stages to the implementation phase of the technology project, the quest of those facilitating the change is to provide an environment that challenges one to change while acknowledging the concerns of those in the community who initially resist transformation. As Kouzes and Posner (1995) describe, "while leaders must act decisively under urgent and uncertain conditions, they must also acknowledge the fear and doubt that people feel as they face the unknown" (p. 78).

An objective of the implementation and training process is to recognize that with any change there is a continuum of apprehension. When faced with change, Bolman and Deal (1997) believe that organizational members may experience "feelings of anxiety, uncertainty or confusion" (p. 321). These feelings may encompass a range of emotions from excitement to disabling fear of the impending change. For example, one might feel a twinge of concern when considering whether the new police radio will work as well as the old.

Conversely, if an organization is proposing the introduction of a totally automated communications dispatch system, a dispatcher might experience extreme anxiety wondering whether his or her job has become redundant in the face of this new technology. Thus, addressing the emotional impact of the planned change is paramount in fostering a supportive transformational process.

In most instances, effective communication eases fear of the unknown. When discussing the process of effective communication Kotter (1996) states the following:

> The time and energy required for effective vision communication are directly related to the clarity and simplicity of the message. Focused, jargon-free information can be disseminated to large groups of people at a fraction of the cost of clumsy, complicated communication. Communication seems to work best when it is so direct and so simple that it has a sort of elegance. (p. 89)

Before choosing a method of communication, one should reflect on the importance of the issue. With this in mind, one considers whether the information will be more effectively communicated through electronic means, such as e-mail and voicemail, or through personal consultation with members of the organization.

Communication also plays an important role when managing barriers during the transition from planning to implementation. Commonly experienced project barriers include financial constraints, time constraints, lack of human resources, or lack of training time. In effectively managing barriers, successful change facilitators acknowledge the existence of the impediments and develop strategies to overcome their effect. Kotter (1996) explains that "whenever structural barriers are not removed in a timely way, the risk is that the

employees will become so frustrated that they will sour on the entire transformational effort" (p. 106).

Often facilitators of a project become frustrated when they experience project resistance. However, resistance to change is inherent to any technology-related project and if valued appropriately may have a beneficial effect. This benefit comes from the role resistance plays in identifying weaknesses within the project plan. Often, individuals who are "skeptics play a useful role, asking critical questions that will help the group recognize potential obstacles" (Public Health Association, 1999, p. 9). By acknowledging, rather than fearing, the influence of these skeptics, one has the opportunity to strengthen the project by overcoming potential barriers. "The impact of change should be identified and measured as early as possible to ensure that appropriate action can be taken to manage any situations that may compromise a successful outcome" (KPMG, 1998, p. 14). Since resistance to a new technology is not time limited it may provide an ongoing method of measuring the success of the technology application. Metaphorically speaking, resistance may indicate the health of a project by identifying gaps in performance and user satisfaction.

One final, but vital component of implementing technology, is the training factor. The need for effective communication exists throughout a technology project and is an essential component of the implementation and training phases. The way that technology training is planned, structured, and taught will significantly influence how individuals approach change. An important aspect of the training process is the ability to provide the learner with a safe and

supportive environment. If people feel supported in making the transition from the known to the unknown, they are more likely to become active participants in the learning transition.

Training is not a new concept to police organizations. Police officers are required to complete mandatory annual training for a number of job related functions including use of force, firearms qualification, and first aid. Police organizations are fortunate to already employ training practices that incorporate an interactive approach. This type of training avoids the downfall of some training processes that employ strictly traditional methodology. Kline and Saunders (1993) reflect traditional training

> is relatively rigid - lectures with flip charts and overhead projectors given to participants who are expected to sit passively and take it all in. Such an approach only reinforces the notion that whatever thinking is to be done has to come from somewhere other than the mind of the employee being trained. (p. 141)

However, traditional methodology does have merit and since using a variety of learning methods will enhance learning, it is important to incorporate different teaching approaches when introducing technology applications.

In addition to using a variety of learning methods, it is important to build on the previous knowledge and experience of learners. As Guns (1996) describes, "most organizational learning takes place in a series of single moments that employees experience every day: within or outside the organization, participating in small-group work, reading internal documents, performing tasks, watching work being done" (p. 16). A good training program will value this knowledge and will incorporate the ideas of the learners as part of the learning process.

Planning for training is an important part of planning for technology change. Unfortunately, a limitation often present when planning for training is a lack of appreciation of the time, the training format, or the funding needed to provide appropriate programs. Kotter (1996) illustrates this limitation in the following quote:

> Training is provided, but it's not enough, or it's not the right kind, or it's not done at the right time. People are expected to change habits built up over years or decades with only five days for education. People are taught technical skills but not the social skills or attitudes needed to make the new arrangements work. People are given a course before they start their new jobs, but aren't provided with follow-up to help them with problems they encounter while performing those jobs. (p. 108)

It is apparent that when bringing in new technology, police agencies need to plan for ongoing learning. One must also acknowledge individual learning styles and the impact that implementing a new technology has on those using the technology. Effective technology training will use a variety of methods that recognize the user's skill level and comfort level as important components of the program.

This section of the literature review has briefly discussed several important aspects of introducing new technology applications in police organizations. A major consideration before undertaking any information technology project is the development of a business plan to ensure that the proposed technology will meet the objectives of the department. The project plan should incorporate an environmental scan of the needs of the organization to determine what functions the proposed technology will address. "Whatever the mandate for change, large or small, the business changes which are sought

should be matched against the overall vision and needs of the business" (KPMG, 1998, p.8).

Once the new technology is recognized as beneficial, the central focus of the program should be the development of a collaborative planning process that values the organizational members as essential contributors in defining the technology application process. As the Ministry of Health states, as "a general operating principle: if your community (organizational) group doesn't get the support you need when you need it, that means you missed a step in the process" (p. 24). In other words, if one encounters resistance or lack of support from internal or external group members, in all likelihood at some point in the planning process, the needs of the resistant group or person were not fully considered or sought.

An effective change facilitator understands the importance of including the people involved with the technology into the planning process. As well, the facilitator should also understand the apprehension and reticence that people may experience when facing a transformational process. Beacham (1999) indicates the profound process that change represents by stating that "one of the most challenging of concepts in our present age is that of change itself" (p. 1).

CHAPTER THREE - CONDUCT OF RESEARCH STUDY

Research Methods

This chapter will examine the research methodology used in the study of this project. The research methodology consisted of applying qualitative and quantitative research methods to determine the viability and functional requirements of a computer mapping application for use by members of the Victoria Police Department.

The selected research methods provided responses, in the form of qualitative and quantitative measurement, on the two main objectives of the project. The first objective was to determine the viability of using computer mapping to assist with operational policing needs. The second objective focussed on determining what information categories and functional capabilities a computer mapping application could provide for police officers.

Action research was chosen as the research method for this study because of its collaborative and qualitative nature. Furthermore, action research, because it involves the researcher as a member of the group, seeks to confirm the validity of the research process. As Palys (1997) describes,

> Qualitative researchers believe that understanding people's perceptions requires getting close to "research participants" or "informants" or "collaborators." You must spend time with them, get to know them, feel close to them, be able to empathize with their concerns, perhaps even be one of them, if you hope to *truly* understand. This approach directly contradicts the quantitative view that "objective" understanding requires aloof detachment, lest the researcher "lose perspective." (p. 19)

One of the essential understandings of action research is that those people or stakeholders who will be affected by the change need to be involved in all stages of the planning process. Stringer (1996) explains that the primary purpose of action research

> is as a practical tool for solving problems experienced by people in their professional, community, or private lives. If an action research project does not *make a difference*, in a very specific way, for practitioners and/or their clients, then it has failed to achieve its objectives. The analogue of hypothesis testing in action research is some form of change or development that is tested by its ability to enhance the lives of the people with whom it is engaged. (p. 11)

Since this project would result in the development of a computer mapping application for use by members of the police department, it was essential that the members become active participants in the concept development and product design.

The use of action research provided a method of collecting data from a representative sample of police officers that will be the end-users of the proposed mapping application. The participative nature of data collection using an action research format provides the ability to reflect on the current project concept and design. As well, the cyclical nature of action research allows one to return to the sample group for follow-up providing an opportunity to make ongoing modifications based upon the suggestions from the participants. Furthermore, by involving members of the department in the project concept and design phases an anticipated response would be a sense of ownership of the project in the sample group. As Morgan (1997) describes

> Action-learning approaches to research build on the idea that it is possible for the research process to have a dual objective in (a) trying to produce useful research knowledge while (b) using a process that can help the people involved in the research to gain a better understanding of their situations. As the term suggests, it seeks to combine action and learning, to create a situation whereby everyone involved in the research learns while doing. (p. 296)

Finally, while the researcher has recognized that action research requires significant time to apply, there are benefits in maintaining involvement with the research participants. These benefits include a continued level of interest in the project development, a collective vision of the final application implementation, and importantly a sense stakeholder ownership resulting from participating in the planning process.

Data Gathering Tools

Data gathering occurred in a two-phase process. The initial phase of research consisted of a series of thirty-minute project presentation and information gathering sessions. Over a two-week period, each shift was given a presentation during morning briefings. The frequency of the meetings provided an opportunity for police officers from different shifts to attend a session. The second phase of the data gathering was a focus group session that tasked participants with identifying the necessary attributes of a computer mapping application. The following discussion elaborates each of the data gathering tools.

The first phase of the data gathering, a thirty-minute presentation and information gathering session, was broken into three parts. The first ten minutes of the session were used to deliver a PowerPoint presentation on the use

of computer mapping for policing. The second ten-minutes were used to demonstrate computer mapping using the prototype application. Finally, the remaining ten minutes were reserved for discussion, questions, and clarification of the project concept, as well as the proposed outcomes. In conjunction with the information gathering session, the participants received a questionnaire that they were encouraged to complete on a voluntary and anonymous basis at their convenience.

The purpose of the five part questionnaire, included as appendix (c), was to determine the project viability. In other words, the questionnaire asked the participants "if you had this application would you find it useful?" To assist in evaluating whether the project should proceed, the questionnaire design addressed two fundamental questions. First, would the participants use the application? Second, what type of incident categories and specific information details for the identified categories would be useful in such an application?

The first section of the questionnaire asked the respondents to indicate their division. The division choices available were Patrol, Community Policing Division (CPD), Traffic, Detectives, and other. The purpose of requesting respondents to indicate their division was to assist in evaluating commonality and divergence that might exist within the questionnaire responses. For instance, a member working in the Traffic division may have a proponent of responses that focus on traffic related concerns, while a Patrol division respondent could focus on property related offences such as theft or break and enter (B&E). The following four questions asked the respondents to indicate

whether they would use the application; how often they would use the application; and what incident types as well as details should be displayed in the application.

A focus group session was chosen for phase two of the data gathering methodology because of its participative nature. When discussing the potential benefits of using a focus group the thoughts of Bennis and Biederman (1997) are appropriate, "none of us is as smart as all of us" (p. 1). The importance of incorporating the ideas and needs of the end-users is further described by Dreaschslin (1998) as follows, "among the greatest strengths of the focus group is its capacity to harness the power of human interaction by capitalizing on relationships and, consequently, generating insights that might not otherwise emerge" (p 1). Thus, the objective of the second phase was to have the end-users decide the look, feel, and functionality of the final product. After the focus group identified and defined the functional capabilities and information category requirements for the proposed mapping application, the requisite components were then integrated into the request for proposal (RFP) for tender of the mapping application development.

Study Conduct

The following discussion will describe the various steps used in completing the research study. Several factors required careful consideration before developing the two-phase research study. First, when designing phase one, which consisted of the presentation and information session, the main

objective identified was to involve as many of the end-users in the research process as possible. Then during the second phase, it was important to bring together a focus group that would represent the variety of people involved in the program use, development, and management. In addition, it was necessary that the focus group adequately represent the diversity of policing divisions who would use the final product.

In developing phase one, an important concern of the study conduct was to identify a method of effectively presenting the project concept to as many potential application users as possible. The population of potential users of a mapping application in the Victoria Police Department is approximately 150 of the 187 police officers in the department. This target population includes officers working in several divisions of the police department and across a variety of shift patterns. The target group included members from Patrol, Traffic, Community Policing, and Detective Divisions. The target group incorporated those officers currently working in the various divisions of the police department that currently use mapped information published by the Crime Analysis Section.

Phase one of the research study commenced in September 1998. An information session, in conjunction with a questionnaire survey, was chosen for the first study phase since the format allowed most department members to attend a session and provide input into the planning process if they wished. From a research perspective, the most practical time to present the concept and to distribute the survey was during the police officers shift briefings that occur in the morning and evening. During these times, members from the various

divisions come together for a meeting to review the events from the previous shift.

The information sessions were conducted in the Patrol briefing room, with graphics displayed to the presentation audiences, of approximately twelve to twenty members per session, using a laptop personal computer and a projector unit. The researcher commenced the presentations by outlining the project purpose and the anticipated sequence of events that would follow depending on the determined project viability.

Identification of several considerations occurred during the phase one planning process. Consideration was given to the length of the presentation, if the sessions were longer than thirty-minutes this would create difficulties for members by interfering with their ability to prepare for the day ahead. As well, a priority of members and supervisors would be attending any calls requiring immediate police attention. Morning briefing was chosen as the presentation forum, because it is traditionally a quieter time of the day, since at 6:30 am there is less chance of a member having to leave the meeting to attend calls. In addition, it is common for the members to attend information presentations, from internal and external sources, during this time.

Another consideration was informing members in advance of the dates and times of the presentation and information session. Approximately two weeks before the presentations, shift supervisors were sent an e-mail outlining the purpose, format, as well as the dates and times of the presentation. The schedule structure encompassed all watches, and additional sessions were

scheduled to provide an opportunity for those absent, such as members on holidays, during the regular shift times to attend. One further consideration identified for the Detective Division was their unique shift schedule. Since, these members work on a different shift pattern from the remaining department, sessions were provided to smaller groups of members, two to three at a time, following the same format.

Further consideration was given to the content and delivery of material during the thirty-minute session. One goal of the researcher was to present the material in an objective format with an attempt not to infuse the presentation with bias. To assist in this goal, the researcher identified the following as his potential personal biases. One of these biases is that the researcher has previous experience using computer mapping and finds the application beneficial. It was important for the researcher to recognize this bias and counter its effect by highlighting both the benefits and limitations of computer mapping during the presentation sessions. For example, one restriction identified in using computer mapping is the need to have accurate data input. The researcher pointed out that members would need to confirm call information, in other words, computer mapping does not imply complete accuracy of call categories, and the member would still need to provide the appropriate information for data entry.

A further bias the researcher identified is his belief that computers will increase productivity and enhance investigative abilities. The researcher has an advanced technology background, and other police officers may not share his interest in computer technology. An additional bias the researcher identified is

his involvement in the planning, development, and design of the prototype application. As such, facets of the program would reflect the researcher's preferences for the functionality and information categories inherent in the application. To address this bias, the researcher clarified that the application was only a prototype and discussed how the future application would reflect the specifications defined by the members. One final bias identified by the researcher is his ongoing participation in the Technology Advisory Group (TAG). TAG is a steering committee, of which the researcher is a member, that acts to advise on any technology related project affecting the police department. The researcher's participation in this committee potentially has influence over the final project outcome.

At the conclusion of the presentation and prototype demonstration, the researcher provided the participants with a questionnaire. The participants were not required to complete the questionnaire, but were encouraged to return the answered survey to assist in determining the project viability. In order to promote return of the questionnaires, and to protect the anonymity of the respondents, the only identifying information asked of the respondents was their currently assigned departmental division. Furthermore, the participants were advised that the results would be used for a presentation to senior management and ICBC for approval of funding for the project. Consent for participation in phase one was assumed with return of the anonymous questionnaire.

Management of participant questions occurred in three ways. First, the opportunity to ask questions or raise concerns was available during the

information session. Second, members were invited to meet with the researcher on an individual basis, if they had further ideas or concerns about the proposed project. This process was set-up to support the participation of members who might not feel comfortable sharing their ideas in a group forum. Finally, the questionnaire format encouraged respondents to provide their ideas and comments on various aspects of a computer mapping application.

Some of the limitations identified with the phase one process are as follows. Having the session coincide with the morning briefings may have made participants feel obligated to attend. However, the issue of obligatory attendance was addressed by encouraging those who had previously attended a presentation, or by providing an opportunity for those who did not wish to attend, to leave before the session commenced. Out of the seventy-eight participants only one police officer, who had not viewed the presentation, chose to leave. A second identified limitation involved the identified target group. By holding the sessions for those members currently accessing computer mapping, the research study may have omitted some members who may in the future use computer mapped information despite their lack of current need.

At the completion of phase one, the results of the study were compiled and incorporated into a presentation to senior management, in conjunction with the phase one PowerPoint session and a prototype mapping application demonstration. The purpose of the senior management presentation was to seek approval for obtaining funding of the project from the ICBC Autocrime Grant Program.

Results of the phase one research were distributed to all members of the department through the TAG meeting minutes. After analysis of the questionnaire, and an affirmative response from the information gathering sessions, the researcher, in conjunction with the approval of senior management of the police department, decided that the process could proceed to the second phase of research.

Phase two of the data collection occurred in August 1999 and encompassed one 3-hour focus group session. The focus group consisted of a ten-person panel, chosen to participate based on their skills, as well as their representation of various areas of the police department. The panel was composed of six police officers representing the departmental divisions of Patrol, Traffic, Detective, Community Policing Division, Communications, Information Systems Section, and Staff Development. The four civilian participants in the focus group represented Information Technology, Staff Training, and Engineering Services – a position represented by a manager from outside the Victoria Police Department. The researcher participated as the focus group facilitator, clarifying or regrouping agenda topics as needed.

Participant selection was based upon two considerations. One of these considerations was to have participants representing areas of the police department that use a mapping application. The second consideration was to select participants who had the requisite experience to represent their particular division within the police department. Participants received an invitation to join the focus group through e-mail sent to them approximately two weeks before the

scheduled meeting date. In the event that the participants were unable to attend the session, the researcher had a list of alternate participants who could be asked to participate. Seven days before the scheduled session, the researcher e-mailed the participants that the venue had been changed to a more comfortable meeting room within the building.

The researcher scheduled the focus group session for a Wednesday afternoon. The purpose of this time selection was to minimize the amount of overtime as several of the participants would be attending on their days off, or working an afternoon shift. An agenda was developed to aid in meeting the objectives of the session within the three-hour period, with the session starting at 1:00 PM and finishing at 4:00 PM. The researcher hoped that during the three-hour session, the participants would discuss the functional requirements for the mapping application, the necessary information categories, any specific details for the application, and finally training issues associated with a new computer application. A support staff member attended the meeting to record the data and transcribe the focus group discussion.

The session commenced with participant introductions since one of the participants worked in an agency outside the police department and had not previously met all of the other participants. Following the introductions, the agenda and handouts relating to information categories and requirements were distributed. The researcher explained that the purpose of the session was to determine the functional and information category requirements of the proposed computer mapping application. In addition, the researcher explained that the

results from the focus group session would form the basis of the request for proposal to be tendered for development of the computer mapping application.

Before commencing the session, the researcher discussed the future use of the gathered information and session results. As well, the participants completed a consent form, (see appendix d). The researcher explained that the session results, in addition to being used in the project development, would also form part of the researcher's project report for Royal Roads University. The participants were reassured that their identities would be protected throughout the research process. At that time, the researcher provided the participants with the opportunity to remove themselves from the session if they did not feel comfortable in participating. Each of the participants continued with the focus group session.

During the phase two focus group session, the researcher provided a demonstration of the prototype mapping application and explained to the participants that the purpose of using the prototype was to have a point of reference in determining the necessary working application functions. At the conclusion of the demonstration, the group was asked to comment on what they did and did not like about the prototype. Approximately 90 minutes of discussion took place around the functional requirements and features of the prototype application. The participants were then provided with food and beverages and had a twenty-minute break. During this time, several of the participants continued to discuss ideas for the mapping application.

The participants reconvened to discuss, which information categories and details would be useful within a mapping application. Participants referred to the handouts provided by the researcher, which depicted each of the available information categories in the department's information management systems. The researcher again acted as a facilitator trying to ensure that each participant provided comments about different information categories. For example, if the participants were discussing information pertaining to theft from vehicles, it was important that each participant was given the opportunity to provide comments, as this type of incident affects various divisions of the police department.

The discussion of issues surrounding information categories extended into the time allotted to deal with training issues. The researcher had set aside thirty minutes to deal with training issues, however the dialogue regarding the information categories was productive for the participants. Thus, the researcher advised the participants that the discussion had ran overtime and asked the group if they would prefer to continue with the current discussion or move onto discussion of training issues. The information trainer and other group participants agreed to continue the current discussion. The decision was made to forward any training related concerns to the researcher who would follow-up with the training section and advise the remaining group members of the any training related outcomes.

At the close of the focus group session, the researcher thanked the participants for their involvement and encouraged those attending the session to follow-up on an individual basis with any concerns or outstanding questions

regarding the project or the research study process. The participants were provided with a copy of the unedited session transcript, along with a summary of the functional requirements and information categories identified for integration into the request for proposal. Finally, the researcher requested that the participants review the minutes and the summary of requirements, forwarding any changes, modifications, or clarifications.

The participants in the focus group worked well together during the three-hour session. It was apparent that as the discussion of information categories moved to different areas, each participant provided suggestions based upon their experience and needs of their respective divisions. The group seemed to work better during the second hour as more discussion centered on the information categories for the mapping application. The participants were energetic and respectful when participants provided their ideas. Although three of the police officer participants were supervisors, holding a higher rank than the other police participants, the researcher did not note that this power imbalance had an obvious impact on the discussion; the ranking police officers did not dominate the conversation, nor did they attempt to influence the other participants during the discussion. The group also welcomed the comments and suggestions provided by the participant who worked in an outside agency. Following the session, one of the participants sent the researcher e-mail thanking him for the opportunity to participate in the focus group stating "I found the atmosphere to be open and sincere".

The transcription of the dialogue from the session provided the researcher with an excellent record of the discussion as it unfolded over the course of the session. From the transcript, the researcher was able to define and detail the functional requirements along with the information categories, for integration into the request for proposal.

The researcher identified a number of biases, similar to those occurring in the first phase of the research. First, the researcher had considerable experience using a computer mapping application, and was involved in the development of the prototype used a s a point of reference during the session. Second, the researcher selected the participants based on past working relationships with the participants. In other words, the researcher selected the participants based upon his opinion of the participant's knowledge, experience, and interest in other departmental projects.

The second phase of the research study was a productive and successful focus group session that provided the information necessary to meet the defined objective of detailing the requirements for the request for proposal. The major consideration identified as a limitation in the second phase of the research study was the process of arranging the focus group session. Attempting to have ten participants, with busy schedules and different shift patterns, attend a meeting together proved a challenging task. However, the desire of the participants to attend helped to overcome this limitation. One further limitation identified was the time allotted for the focus group. Unfortunately, not enough time was available to discuss training concerns. Management of this limitation could

occur by scheduling a follow-up focus group session, to specifically deal with training issues, once the mapping application is developed and before its implementation.

The focus group session concluded the formal research study. Results from phase one and two of the research process was studied, collated, and analyzed to form the mapping application requirements as defined in the request for proposal.

CHAPTER FOUR -RESEARCH STUDY RESULTS

This chapter provides a detailed examination of the results and observations derived from coding the data of the questionnaire and focus group sessions described in Chapter Three. As discussed in the previous chapter, the research methodology included two phases: first, presentation sessions that incorporated a questionnaire, and second a focus group session.

The researcher used random sampling to gather participants for the presentation sessions and questionnaire in phase one. As Palys (1997) describes,

> two criteria are essential for random selection: nothing but chance must govern the selection process, and every sampling element must have an equal probability of being selected. If those criteria are met, the resulting sample will be representative of the population included in the sampling frame (p. 125).

The researcher met the above criteria by presenting the sessions at a variety of times in a format that allowed each section of the department and every member of the department to attend. Using a random sampling method provided validity to the research results since the participants of phase one represented a broad spectrum of the departmental members who have a wide range of technology backgrounds.

In phase two, seeking to incorporate the understandings of people with a high technological orientation, the researcher chose to use a purposive sampling method. With this sampling method "people or locations are intentionally sought because they meet some criterion for inclusion in the study" (Palys, 1997, p. 137). The focus group members represented a variety of interests including

department members, Information Technology Section stakeholders, the Information Trainer for the department, and a manager of an outside agency involved with Engineering Information Systems. Gathering the ideas and opinions of these focus group members was an essential component of confirming the study findings from phase one, in addition to determining the functionality and requirements of the mapping application program.

The following section will expand on the previous research methodology discussion by describing the study results of the questionnaire and the focus group. As well, in this section of the report, the researcher will draw on the study results to outline the conclusions and recommendations generated from the research.

Study Findings

As Chapter One explained, the research question for this project is:

> What is required to successfully integrate computer mapping to the information management system of the Victoria Police Department?

For the study findings to support the research question, four components need to be present in the study findings. The first of these is that the results will demonstrate that the computer mapping application is useful and beneficial. Second, the research results should indicate that the end-users of the application would regularly use the application. Third, the study results would indicate the necessary information and functional requirements of the application. Finally,

the research findings should indicate the training requirements needed to successfully integrate the mapping application.

Phase One Questionnaire Findings

The five-part questionnaire was distributed to 78 members of the Victoria Police Department; the response rate was high at 54% with the completion and return of 42 questionnaires. Overall, the format of the questionnaire was qualitative in nature since each of the questions asked for additional information or required a written response. The researcher chose a format of open-ended questions to increase the validity of the research results. Palys (1997) explains that

> open-ended questions leave a lot up to the respondent; they really are open to a wide range of responses, depending on the respondent's own concerns. Closed or structured questions, in contrast, allow the respondent only a small range of responses ... and involve some *pre-supposition* on the researcher's part about which aspects of a given issue are important to address. (p. 164)

By allowing the respondents to use their own words to describe why and how a mapping application would be useful, the researcher minimized the influence of suggestion. Although the researcher strove to decrease external influence in the questionnaire format, as part of the open-ended question format some suggested answers were given, one could then speculate as to whether these suggestions were leading to the respondents. However, while the suggested answers did appear in some questionnaire responses, they did not appear in all responses and were not identified as dominant themes.

The first section asked the respondents to provide some demographic information by indicating the area of the department in which they worked. As indicated in table 4.1, 71 percent of the respondents worked in the area of Patrol and 17 percent of the respondents indicated that their area of work was in the traffic division. The Community Policing Division and the Detective division respectively represented five and seven percent of the respondents.

Division of Respondent	Number of Responses	Percentage
Patrol	30	71%
Community Policing Division	2	5%
Traffic	7	17%
Detective	3	7%
Other	0	0%

Table 4.1

Since 71 percent of the respondents were from Patrol, the division that generally represents the operational members of the department, the data from the questionnaire is applicable to the research question. Yet, as Cook and Campbell, (as cited in Palys, 1997)) suggest, "even if one acquires a representative sample and hence generates results that can be generalized to the population as a whole, those results won't necessarily also hold for all subgroups within the population" (p. 136). Due to the relatively small sample size of 42 respondents, and recognizing that a smaller sample size increases the risk of error when using random sampling methods, if the researcher found a significant variance in a data result, he would need to complete further research to explore that area. However, in this particular research study, the results found in the

data, for questions one to three, were highly congruent amongst each departmental area.

Following the demographic section of the questionnaire were four open-ended questions that sought the members' comments and ideas on what incident types would be useful to incorporate into the application.

The first question asked, "Do you think a mapping program is a useful tool for operational members?" The respondents were asked to indicate yes or no and to detail their responses. The results of this question were highly affirmative with all of the respondents indicating that a mapping application would be useful. Two metathemes emerged from the question one data regarding how the mapping application would be useful. These metathemes are visual representation and pattern or problem identification. Within each of these metathemes two theme areas were also apparent (see table 4.2)

Metathemes and Themes from Study Results of Question 1 Is a Mapping Application a Useful Tool For Operational Members?	
Metatheme 1 Visual Representation	Metatheme 2 Problem or Pattern Identification
Theme 1: Timeliness of Information	Theme 1: Resource Allocation
Theme 2: Ease of Use	Theme 2: Investigative Aid

Table 4.2

The first metatheme to emerge from the data was the usefulness of the visual representation of the mapping application. Many of the respondents

commented that "at a glance you get an overview or a detailed breakdown of crime trends in a particular area" (Gehl, 1999). Two themes emerged related to the metatheme of visual representation. These themes are timeliness and ease of use.

The theme of timeliness refers to the ability of the mapping application to provide "up to date visual information" (Gehl, 1999). Respondents identified that the tool was an "efficient method of transferring information to others" (Gehl, 1999). In addition, the application provided "timely info to be applied proactively and reactively. Thus, the application was noted to be a useful tool allowing officers to "make sense of and organize the calls we take" (Gehl, 1999).

A second theme relating to the ease of use of the application emerged under the metatheme of visual representation. Several of the respondents indicated that the tool made it "easier to view, access, and obtain information" (Gehl, 1999). As well, respondents commented positively on the functional capability of the mapping application that provides the officers with "easy access to info on scene" and the "ability to extract information" (Gehl, 1999).

The second metatheme derived from the analysis of the first question refers to the usefulness of the mapping tool, as one respondent indicated, "in identifying problem areas" (Gehl, 1999). One further respondent indicated that the tool "makes use of the data we spend a great deal of time collecting" (Gehl, 1999). Once these patterns are identified, the tool then assists further by helping to identify where to allocate work force resources.

The aspect of resource allocation was one of two themes that emerged under the metatheme of pattern identification. One of the respondents noted that the application proves useful by allowing "more accurate and efficient targeting of problem areas" (Gehl, 1999). A second respondent echoed this thought and commented that the tool provided the "ability to concentrate activities to problem areas" (Gehl, 1999). Once resources have been allocated, the mapping application broadens its usefulness as an enhancement to crime investigation.

The second theme derived under the metatheme of pattern identification is the usefulness of the tool as an aid to investigations. In other words, the mapping tool is useful not only for highlighting the crime problem areas, but also as "a vital tool to enhance the investigation of a crime" (Gehl, 1999). A number of respondents indicated that the application would be a beneficial investigative tool since it provides a "valuable source of information" (Gehl, 1999).

Thus, the first question of the study results indicated that respondents felt the mapping application would be a beneficial tool. This was an important determination for the researcher to make since it supports the research question. An essential facet in determining what is required to successfully integrate a computer mapping application is the confirmation that the operational members would find a mapping application useful.

The second question of the questionnaire asked the respondents, "what are the incident types you feel would be beneficial to see in a mapped display (fights, panhandlers, etc.)?" Five categories of incident types (see table 4.3)

emerged from the study findings. These categories were, in order of frequency of occurrence, property crimes, auto crimes, persons, location and movement (L&M), and traffic enforcement.

The incident category of property crimes occurred most frequently with 38 respondents commented on this category. Of these respondents, 79% indicated that it would be beneficial to see break and enter (B&E) incidents in a mapped display. Also noted in the property crime category as being valuable incidents to display were theft (all types), pawn information, and property crime information.

Property Crimes	Auto Crimes	Persons	Locations and Movement	Traffic Enforcement
Break and enter	Theft from vehicle	Disturbances: fights, noise complaints	Street check of a known offender or suspicious person	Motor vehicle accident information
Theft all types	Theft of vehicle	Assault all types		Traffic enforcement: where, why and when tickets are written
Pawn information	Areas of vehicle disposal	Mischief		
Property crime information		Suspicious persons		
		Drug offences		

Table 4.3

The next category, 33 respondents cited as important to include in a mapped display, was auto crime incidents. Theft from vehicle and theft of

vehicle emerged as essential incident types to display. Also mentioned under this category was the display of areas where stolen vehicles are commonly abandoned.

The third category evidenced in the study results for question two is that of persons. This category refers to crimes that include, but are not limited to, disturbances such as fights or noise complaints, assaults of all type, mischief, drug offences, and suspicious persons. Respondents indicated a variety of incident types from this category that would be beneficial to see in a mapped display, but the frequency of responses occurred most often for the incident types of disturbances, assaults, mischief, and drug offences.

The fourth category present in the study findings is that of location and movement (L&M). L&M refers to the process whereby officers check on a known offender or suspicious person. The member then submits a brief synopsis of the check, which is entered into the records information system. A number of respondents indicated that this would be a valuable incident type to include in the mapping application.

The final category that emerged from the question two responses is that of traffic enforcement. Two incident types noted for this category are motor vehicle accident and traffic enforcement. Traffic enforcement would include where and why tickets are written.

The third question asked the respondents "what details for each incident type would you want to be displayed? (e.g. Theft from auto – vehicle make, year, etc.)." Findings from this question support and parallel the findings from

question two since the details noted directly related to the incident types identified as beneficial to see in a mapped display.

In order of occurrence, the respondents indicated that they would want the following details displayed:

1. Property information
   - Information about stolen and recovered property
   - Descriptions of the property, including make and model

2. Break and Enter details
   - Time, date, and location
   - Point of entry and method of entry

3. Modus Operandi – suspect's method of operation

4. Suspect Information
   - Suspect name and description
   - Number of suspects
   - Tools used in B&E
   - Cautions with regard to weapons
   - Associated Vehicles

5. Incident Reference
   - File number
   - CAD Call number (Computer Aided Dispatch number)

The fourth and final question asked respondents to indicate the frequency with which they would use the mapping application based on the features they had previously listed. Table 4.4 indicates the study findings for frequency of use and percentage of respondents who noted this value. Five of the forty-two respondents selected more than one category for frequency of use. One of the respondents, who indicated several responses for frequency of use, elaborated that the seriousness or frequency of an offence would influence this access. This respondent went on to comment that "this is the best 'tool' so far in this computer

generation of policing...for the 'visual' persons this concept is a dream" (Gehl, 1999). Three respondents indicated that the program would be used "once per shift minimum". One of these respondents indicated that once per shift "is a minimum – it would change based on circumstances".

Frequency of Use	Number of Responses	Percentage
Several times per shift	27	64%
Once per shift	10	24%
Once per block (one block = 4 X 12 hour shifts)	5	12%
Never use it	0	0%
Total	42	100%

Table 4.4

This question, asking respondents to indicate how often they would use the mapping application, represented the only significant divergence in the study results. Although the majority of the respondents indicated that they would use the program several times per shift, five respondents indicated they would only use the program once per block. Three of these respondents were detectives, one respondent was from CPD, and one was a patrol member.

While this result does not deter from the study findings of the mapping application as being a useful tool, this differentiation is significant for future consideration of training allocations. As such, this area of the study results indicates that the departmental section most likely to find immediate benefit from the mapping application is the Patrol Division. In other words, if a limited

training budget exists, the Patrol Division of the department should be designated as the section to receive the initial funding.

The study findings for question four indicate a majority of operational members would use a mapping application similar to the prototype demonstrated during the presentation sessions. In the comment section provided for question four, 69% of the respondents provided a written response. None of the written comments provided negative feedback regarding the mapping application program. One respondent stated that "money for this system will be well spent" (Gehl, 1999). Another respondent stated "I strongly believe this would be a valuable tool in effectively doing our job. This would enable us to have a strong proactive role in preventing &/or investigating many incidents – especially property crimes" (Gehl, 1999).

The questionnaire results strongly support integrating a mapping application. For instance, some of the comments from respondents (Gehl 1999) included:

- "unlimited potential and use"
- "an excellent idea with a common sense approach to assist police in better enforcement initiatives"

However, some respondents cautioned the researcher to consider the technical capabilities of the end-user. For instance, one respondent commented "good idea – must be easy to use...not computer experts" (Gehl, 1999). Similarly, another respondent stated "I think as it became implemented people would use it more often as new applications arise. The more complete the system, the more people will use it, especially if it is user friendly" (Gehl, 1999). These comments became

important considerations during the focus group session in phase two of the research. For instance, it was important to highlight simplicity of use and technical capabilities of the end-users as recommendations from the phase one research findings.

Phase Two Focus Group Findings

The purpose of the research focus group was to incorporate the research findings from phase one into the development of the request for proposal (RFP) to design the mapping application. The participants of the focus group expanded the study findings in phase one by applying the information categories and details indicated in the questionnaire results to the process of developing how the final mapping application would look and function. During the RFP development process the focus group examined three aspects: first, how would you want to display the information, second, how would you like the information to look, and third, how would you like to query the information? Finally, the focus group discussed training and evaluation components of the mapping implementation process.

The focus group determined three objectives for the initial phase of the mapping application. As indicated in the RFP (Gehl & Hennessey, 1999) appendix (e), these objectives are:

1. To provide operational members in the field with access to 'user defined' mapped information on criminal and non-criminal activities within the City of Victoria.

2. To provide mapped information from the HTE information management system which includes, Computer Aided Dispatch (CAD), and Records Management System (CRIMEs), that will enable operational members to access timely, detailed information to, in turn, assist as an investigative tool for specific incidents.

3. To provide operational supervisors with mapped information that will assist with decision support, for deployment resources.

As well, the focus group concurred with the categories and incident details outlined in the phase one-research results. Thus, five incident type categories were outlined by the focus group (Gehl & Hennessey, 1999, appendix (e)). The application design would allow user defined access to date and time parameters in the for the following incidents:

1. Auto crimes (stolen vehicles, theft from vehicles, recovered stolen autos).

2. Traffic Accident/Enforcement information (information from accident and violation ticket tracking modules).

3. Property crimes information (residential and commercial break and enter).

4. Location and movement information (persons checked relative to incident locations)

5. General CAD information (information on a variety of CAD call types for resource deployment, e.g., assaults/ disturbances/ panhandlers, etc.)

The objectives of the mapping application and the incident categories were incorporated to form part of the application requirement section for the RFP.

The focus group again corroborated the phase one group results and stated that the application must be "simple to use" (Gehl & Hennessey, 1999, p. 4). Therefore, the focus group members outlined that the application required

functionality to support this simplicity and to allow for training to be carried out through roll call training while the members are on duty. Another requirement identified and incorporated into the RFP, was that the program supplier would be responsible for provided a four hour training seminar to the information trainer along with six to eight members; in turn, these participants would train the remainder of the police department members.

Finally, the focus group determined that evaluation of the mapping application would be ongoing. The measurement indicators would be based on the frequency of application use on a monthly basis coupled with the users' comments on the benefits and limitations of the application in the performance of their duties.

Implementing the developed computer mapping application would require changes to the current structure of information management within the Victoria Police Department. As with any change process, there are issues inherent to this process that need attention. The following chapter will discuss some of these issues in detail.

Study Conclusions

The study findings from both phases of action research positively support the research question of what is needed to successfully integrate computer mapping into the Victoria Police Department. While several conclusions have been derived from the study results, the most significant conclusion is that the integration of a mapping application would be a useful tool for operational

members. This conclusion is highlighted since there would be no need to proceed further with the program development if the program was found non-viable. The following list indicates four conclusions drawn from the study results:

a) A computer mapping application is a useful tool for operational members.

b) The computer mapping application should include five incident categories. These are property crimes, auto crimes, persons, location and movement, as well as traffic enforcement.

c) The application must provide timely information that is easily accessed by members with varying degrees of computer skill.

d) The Patrol Division should be the focus of the initial training on the application use.

Study Recommendations

The study findings indicate support for the process of integrating a mapping application. Thus, the researcher recommended proceeding with development the Request for Proposal (RFP) for subsequent tendering for development of the computer mapping application. In addition, the researcher recommended integration of the research results into the RFP to ensure that areas such as simplicity of use, incident categories, and end-user defined processes were included in the application design. Finally, the researcher recommends that further research incorporate stakeholders external to the Victoria Police Department. By including other departments in future research, the potential exists for information sharing across multiple agencies.

CHAPTER FIVE – RESEARCH IMPLICATIONS

Chapter five of this report discusses two areas of the project research implications. These areas are implications related to implementing a computer mapping program application to the Victoria Police Department information management systems, and the considerations for further research.

Organization Implementation

The planned implementation of the proposed mapping application will employ an incremental approach starting with acquiring and installing ten computer workstations and a server to run the mapping program. The overall goal of the implementation plan is to provide an opportunity to ascertain if computer mapping provides an efficient means of accessing and disseminating information to members of the police department. The initial implementation of the mapping application will be to the Victoria Police Department, with the potential for future expansion of the project to multiple police agencies. Figure 5.1 provides a visual representation of the implementation process.

Specific departmental implications for project implementation include determining the needs of the IT section. The IT section will need to write the queries and install the software components necessary to use the mapping application. Other commitments of the IT section could potentially delay the implementation of the mapping application. However, the IT section were

involved throughout the planning process and were consulted regarding the programming requirements; therefore, the IT section has allotted time to complete these requirements. As well, if the IT section meets with unexpected demands and does not have the necessary time available to manage the technical requirements of the application, the project budget has a provision allowing for contract IT personnel to fulfil this component of the implementation process. The IT section of the Victoria Police Department was involved in planning for the provision for contracting outside programmers, thus bringing in external help should not become a conflicting situation for the internal IT section.

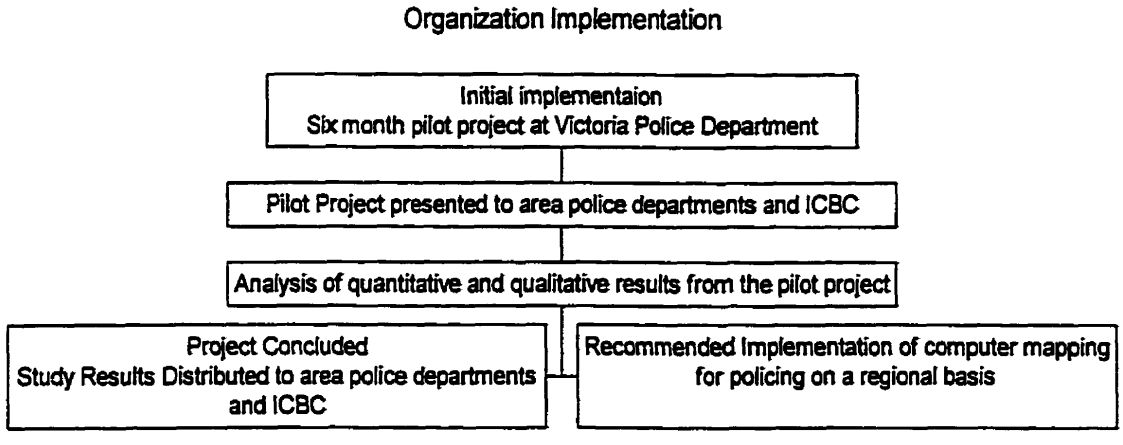

Figure 5.1

Once the technical aspects of the mapping application are developed, the next phase of implementation is the training component. The planned training sessions will be one hour long with approximately six members attending a session. The training session format will be a "hands on" interactive session with the new application. Members will be given a series of problem scenarios to solve using the application. For example, these scenarios may include locating a

specific make and model of stolen vehicle, or determining how many break and enters occurred with the same methods of entry over a specified period. The planned training includes additional sessions for members who feel they need more time to become familiar with the application.

Using the new application at the start of each shift and as an investigative aid are two applications of the mapping program that the trainer will highlight for members and supervisors to use during the program pilot. Since the mapping application represents new technology, the researcher will solicit ongoing comments from the users for improvements to the system. In addition, the statistical log function within the computer mapping application will monitor the program usage; throughout the pilot program, the researcher will review the derived usage statistics on a monthly basis. When the six-month period for the pilot occurs, the researcher will distribute a follow-up questionnaire to the application users. Using an open-ended question format, the aim of this follow-up questionnaire is to determine how often the members use the application, if the information accessed in the application is useful, and if there is perceived benefit in moving to a multi-agency level for computer mapping.

As an adjunct to the pilot project, the researcher will provide information sessions to area police departments and to ICBC on the scope and purpose of the pilot project. The information sessions will include the perceived benefits of sharing information through computer mapping on a multi-agency basis. At the completion of the project, the researcher will distribute the study results from

the pilot to ICBC and area departments. If the study results are favourable, the next phase in the implementation process to move toward regional employment of the computer mapping application or a similar application capable of supporting multiple police agencies.

From the organizational standpoint, a final point to discuss is the implication of not undertaking the change process. For the overall functioning of the Victoria Police Department, there relatively few implications if the program did not proceed. However, one implication is that the department would miss the opportunity to participate in the process of determining if computer mapping is a viable tool for police officers to use in accessing and disseminating information. In addition, the department could overlook a valuable opportunity to explore the expansion of existing technology to meet information management, resource allocation, and investigative needs.

Future Research

There are several recommendations the researcher would make toward enhancing future research in the study of computer mapping applications. Although the research results from this project illustrate the types of information that police officers as end users of a computer mapping application require, one limitation of this study is the isolation of the research sample group to a single police department. Future research could broaden the sample size by studying responses from multiple police agencies, thus addressing the issues of reliability and validity of the research results. As Palys (1997) explains,

reliability refers to "the degree to which repeated observation of a phenomenon – the same phenomenon at different times, or the same instance of the phenomenon by two different observers – yields similar results" (p. 424). Thus, to provide reliability to the data, future research would seek to validate the statistical significance of the research study findings by expanding studies to include other police agencies.

Finally, one further recommendation for future research is to seek larger representation from sections outside the Patrol, Community Policing, Traffic, and Detective Divisions. Future researchers could consider expansion of this sample group to include specialized sections such as: Forensic Identification Units who may use computer mapping for crime scene analysis, and Emergency Response Team or Explosive Disposal Units that may identify computer mapping as a useful tool in managing critical incidents. For instance, these sections may employ computer mapping applications proactively to map high risk premises such as public buildings or schools; these generated maps could then be used to assist officers in managing containment or manpower disbursement in emergency situations including hostage taking, building fires, or bomb threats as examples.

CHAPTER SIX – LESSONS LEARNED

Research Project Lessons Learned

There are several lessons the researcher learned during the project process. First, pilot projects involving the implementation of new technology in an organization are extremely time consuming. This was one area that the researcher underestimated, as such an important understanding the researcher gained is that planning technology change for an organization requires patience because there will be delays. An essential component of managing the time considerations is to expect and accept delays. As well, consideration must be given to the time commitments, schedules, and priorities of other stakeholders. For example, this project commenced in the fall of 1997 and took two years to move into the RFP and tender phases; however, the researcher had prematurely anticipated that the same process would occur in a much shorter period of time.

A second lesson the researcher learned concerns the demographics of choosing the sample group. In this project, the sample group was limited to 78 participants who represented police officers. Ideally, the researcher should have included all sworn and civilian staff of the Victoria Police Department in the presentation and questionnaire components of the phase one research study. By not including all members of the department, the researcher limited the sample size of the project and potentially missed important input by civilian members of the department who are involved in processes such as data entry into the

computer mapping application. In future project development, the researcher would incorporate a broader sample size.

The third lesson the researcher identified is that the focus group session, to determine the functional and information requirements for the application and the RFP, may have benefited from the inclusion of participants from other area police agencies who are potentially future users of the application. During the planning process, the researcher considered asking other departments to participate. However, due to the broad and differing continuum of technological infrastructures of the nine local police departments, the researcher decided to limit the first phase of the pilot study to the Victoria Police Department. After completion of the initial pilot, the researcher would seek expansion of the project to include the involvement of other police agencies.

Although not necessarily a lesson learned by the researcher, but a component that the researcher identifies as integral to the success of the project, is ongoing communication with the project stakeholders and participants. One limitation the researcher experienced was that time constraints and commitments to other work projects prevented him from attending further briefing sessions to personally provide updates to members of the department. To attend to this constraint, throughout research phases of the project, the members of the organization received status reports and updates through circulation of the minutes twice monthly meetings of the department's Technology Advisory Group (TAG).

Again relating to time constraints, the researcher found that planning adequate amounts of time for each phase is an important aspect of the research process. To promote discussion and awareness of the pilot project, before both of the action research phases, the participants were provided with information concerning the purpose and content of the sessions. The researcher found that the phase one presentation and questionnaire sessions worked well and that adequate time was available during the briefing sessions at the commencement of the shifts. In contrast, the researcher found that the three hours provided for the focus group was not enough to fully discuss training requirements. To address this limitation, the researcher had a preliminary meeting with the trainer to discuss the training needs. In addition, before implementing the project, the researcher, trainer, and program developer are meeting to address training requirements. For future focus groups, the researcher would set aside a minimum of four to five hours depending on the project requirements.

To conclude this section, the lessons learned by the researcher during the research phases are concentrated to three areas. These areas are organizational participation, ongoing communication with stakeholders and participants, as well as relationship building. When planning future research projects the researcher would endeavour to include a broad base of organizational participation. Finally, the researcher recognizes the importance of fostering and maintaining strong collaborative relationships with all internal stakeholders, external stakeholders, and participants.

Program Lessons Learned

Required Competencies:

1c. Provide Leadership

Three characteristics demonstrate this competency. First, the researcher demonstrates leadership by adjusting his or her leadership style to meet the needs of a given situation. Second, the researcher demonstrates a commitment to see the successful completion and implementation of the project. Third, the researcher consistently provides an example for others to follow. The ability of the researcher to demonstrate this competency may be evaluated by the faculty supervisor and the project sponsor.

The researcher initiated this project in November of 1997. During the last two years, numerous challenges arose which created delays in proceeding with the project. For example, the pilot project required an initial budget of $65,000.00. Funding was received from ICBC Auto Crime Strategies after the researcher made application, and provided a presentation to the funding selection panel on the scope of the project. At this time, the pilot project described in the Major Project report is underway with implementation of the computer mapping application scheduled for April of 2000.

Recognizing that projects require time and commitment, the researcher demonstrated this competency by moving forward in the project development although the delays at times proved frustrating. As well, the researcher

demonstrated this competency by employing an inclusive and collaborative approach throughout the project.

2b. Apply systems thinking to the solution of leadership and learning problems.

This competency evaluates the researcher's ability to apply systems thinking to the solution of leadership and learning problems. Characteristics that demonstrate this competency include maximizing consensus amongst the systems affected by change, effectively planning and managing project development, identifying system elements that may influence the change process, and selecting strategies that support the workplace climate. In as much as the project report includes an in-depth discussion of the action research method used, research implications, and lessons learned the faculty supervisor may evaluate this competency. In addition, the workplace sponsor may also evaluate this competency since the researcher and the workplace sponsor have spoken regularly about the project and its ongoing developments. As well, the researcher has provided the workplace sponsor with copies of the data results in the project proposal and from the focus group sessions.

The researcher demonstrated the ability to apply systems thinking throughout the research project. He employed action research methodology to facilitate the active participation in the research process of department members. Understanding that the project would only have viability if recognized by the end users as important, the researcher developed a project plan that sought ongoing input from system stakeholders throughout the planning process.

The researcher continued to demonstrate the value he places on systems thinking and collaborative leadership and carried out numerous presentations to these groups during the course of the project.

The researcher further demonstrated this competency by the development and integration of the project plan. The researcher developed a plan that moved through the processes of identifying the initial project concept and outline to the definition of the RFP – the deliverable of the project; this planning process demonstrated systems thinking. For instance, the researcher developed a format of information sessions that involved the organization through presentations and a questionnaire. As well, the researcher then presented the results of the questionnaire to the department's senior management, to seek their recommendations before proceeding. After acquiring the funding from ICBC, the researcher returned to the organization to facilitate a focus group to define the RFP requirements.

Identifying the need to modify existing information management systems used the Victoria Police Department to provide more efficient information management, the researcher applied systems thinking when preparing the content of the presentations. Finally, the questionnaire and focus group strategies were selected for this project as effective ways of seeking participation from a large number of individuals within the organization; thus demonstrating the importance of including organizational participation as a method of supporting change strategies.

5a. Identify, locate and evaluate research findings.

The literature review and research result analysis in the Major Project report demonstrates mastery of this competency. The scope of the literature review illustrates the impact of technology change in organizations. Furthermore, the research on computer mapping for police applications provides the reader with an understanding of what the future holds for geographical information systems (GIS) for police organizations. In particular, the literature research describes the shift in technology focus for GIS from a specialized section using GIS for crime analysis to a computer mapping application accessed by the end-user.

The analysis of the research methodology and findings also demonstrates mastery of this competency, which may be evaluated by the faculty supervisor and the project sponsor.

5b. Use research methods to solve problems.

The Major Project and the final report demonstrate the researcher's use of two processes to collect information from the organization toward the development of the requirements for the computer mapping application. The selected methods incorporated qualitative and quantitative measurements. Research results from these action research phases contributed toward the information and functional requirements for the pilot phase of the computer mapping application for the Victoria Police Department. Evaluation for this competency is based on the research methodology, and study results of the Major

Project report. The faculty supervisor and the project sponsor may evaluate this competency

7b. Communicate with others through writing.

Completing the Major Project allowed the researcher to communicate in writing in a variety of formats. During the course of the project, the researcher communicated in writing to both internal and external stakeholders as well as participants. The researcher used several writing styles when preparing the various written materials for the project such as the questionnaire that was given to participants and the request for proposal that would become part of a legal and binding contract; writing the latter required clear and succinct language.

The researcher also demonstrated academically proficient writing of publishable quality in preparing the project report. Use of literature references and publishable material are demonstrated through the content of the Major Project final report.

The faculty supervisor and the project sponsor may evaluate this competency.

Optional Competencies

1b. Demonstrate leadership characteristics.

This competency is demonstrated by the researcher's ability to employ the skills of consensus building and visioning. This competency may be evaluated by the project sponsor who participated in the review and recommendations for the final contract for funding the pilot project.

The initial phase of action research for the Major Project involved consensus building to determine the interest and viability of proceeding with the pilot project. The effectiveness of the consensus building through the action research phases is demonstrated through the study findings and the focus group responses given by the project participants. The researcher incorporated the participant responses within the study results portion of the Major Project final report.

A significant barrier that was identified from this project concerned the delays in obtaining funding to proceed with the pilot project. Funding was provided through a grant from an external agency. The time required establishing the language terms for the contract between the City of Victoria, and ICBC caused delays. The researcher minimized the effect of these delays by continuing to communicate with ICBC and encouraging forward movement of the project.

3b. Provide consulting services to help organizations succeed.

This competency is demonstrated by the researcher acting in a consulting role to provide organizations with the analytical tools and organizational necessary to help them succeed.

The researcher demonstrated this competency by planning and implementing the various phases of the research project necessary to complete the request for proposal stage of the pilot project. The main purpose of this project was to improve the organizations' ability to manage information. This is consistent with the Victoria Police Department's strategic plan to use technology to make the organization more effective. The researcher has identified the statistical measurement built into the computer mapping application and a follow-up action research based qualitative survey as the organizational performance indicators for the study to be carried out six months after the implementation of the pilot application. Results will be compared to the initial survey sample, which will serve as a benchmark for measurement.

The project sponsor may evaluate this competency most effectively.

3c. Create and lead teams.

The researcher striving to build effective teams and change development skills characterizes this competency. As well, this competency is indicated by the ability of the researcher to establish and monitor team tasks.

The researcher demonstrated this competency through the process of presenting the project concept proposal of implementing computer mapping to

members of the organization and external stakeholders to receive funding. Throughout the project process, the researcher fostered participant interest in the scope and development of the project.

The researcher also demonstrated this competency by recruiting, organizing, and facilitating a focus through the process of determining the functional and information requirements used in developing the RFP for tendering. Both phases of research required considerable written and oral communication to bring to a successful conclusion. The project sponsor may evaluate this competency most effectively.

4b. Evaluate the influence of technology on learning.

This competency is demonstrated by the researcher's understanding of information management and the potential benefits of applying computer mapping technology to a police organization. The content of the Major Project report describes the impact of a new technology and addresses the need for ongoing learning and training for the members of the organization. Furthermore, the report discusses the need for regional sharing of police information using existing technology. The researcher recognizes that while many facets of police training require a structured approach, when implementing technology applications there is a need for policing to make an organizational and cultural transition away from traditional learning and training practices to a learner centred approach. Referring to the Major Project report, the faculty supervisor and the workplace project sponsor may evaluate this competency.

7c. Communicate orally.

This competency is demonstrated by the ability of the researcher to appropriately communicate orally with others. Facets of this competency include the ability to communicate verbal and non-verbal messages clearly. In addition, this competency is demonstrated by valuing the contributions of others and facilitating discussions that ensure that all participants have the opportunity to contribute their ideas. The project sponsor may evaluate this competency most effectively.

The Major Project provided a number of opportunities for the researcher to speak with large groups and individuals. This communication included conversing with and presenting to peers and senior managers from the Victoria Police Department, in addition to senior managers from external stakeholder agencies such as ICBC. During the presentation sessions, the researcher employed PowerPoint and a prototype mapping application to provide visual images to support his oral presentation. In addition, the researcher used formal and informal dialogue to engage participants. These communication processes allowed the researcher to build on pre-existing relationships with participants in the Victoria Police Department and to develop new relationships with external stakeholders and project participants.

EPILOGUE

At the time of submission of this thesis, the computer-mapping project is well into the implementation phase. In December of 1999, through a tender process, using the Request for Proposal developed during the project research, a software vendor was selected to design the actual computer mapping application. GeoInfo Solutions©, the company that designed the prototype computer mapping application, was the successful vendor from the tender process.

In January of 2000, the Information Technology Section of the Victoria Police Department began writing the programs to extract the information from the Records Management Systems (RMS) and Computer Aided Dispatch (CAD) modules of the information management systems used by the police department. At the same time, ten additional computer workstations, a computer server, and necessary software have been purchased for the implementation.

It is anticipated that the computer mapping application will be fully implemented with training completed by May 2000. As stated previously, after completion of the six-month pilot project, an evaluation will occur to determine the viability of expanding the application to other police agencies within the lower Vancouver Island area.

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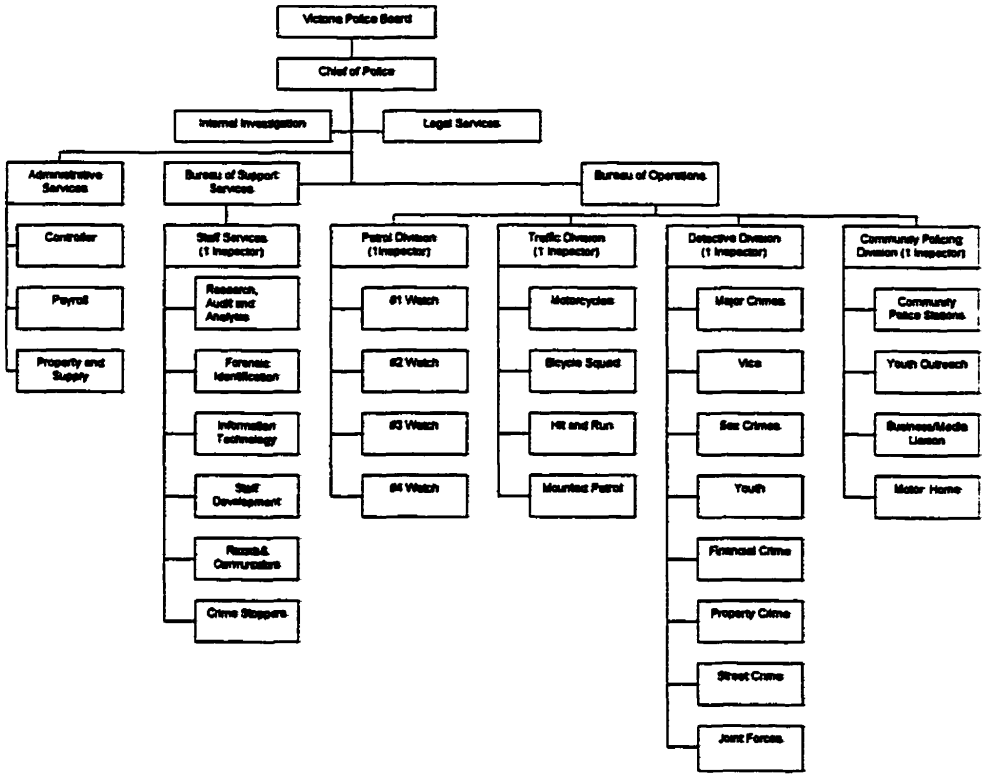
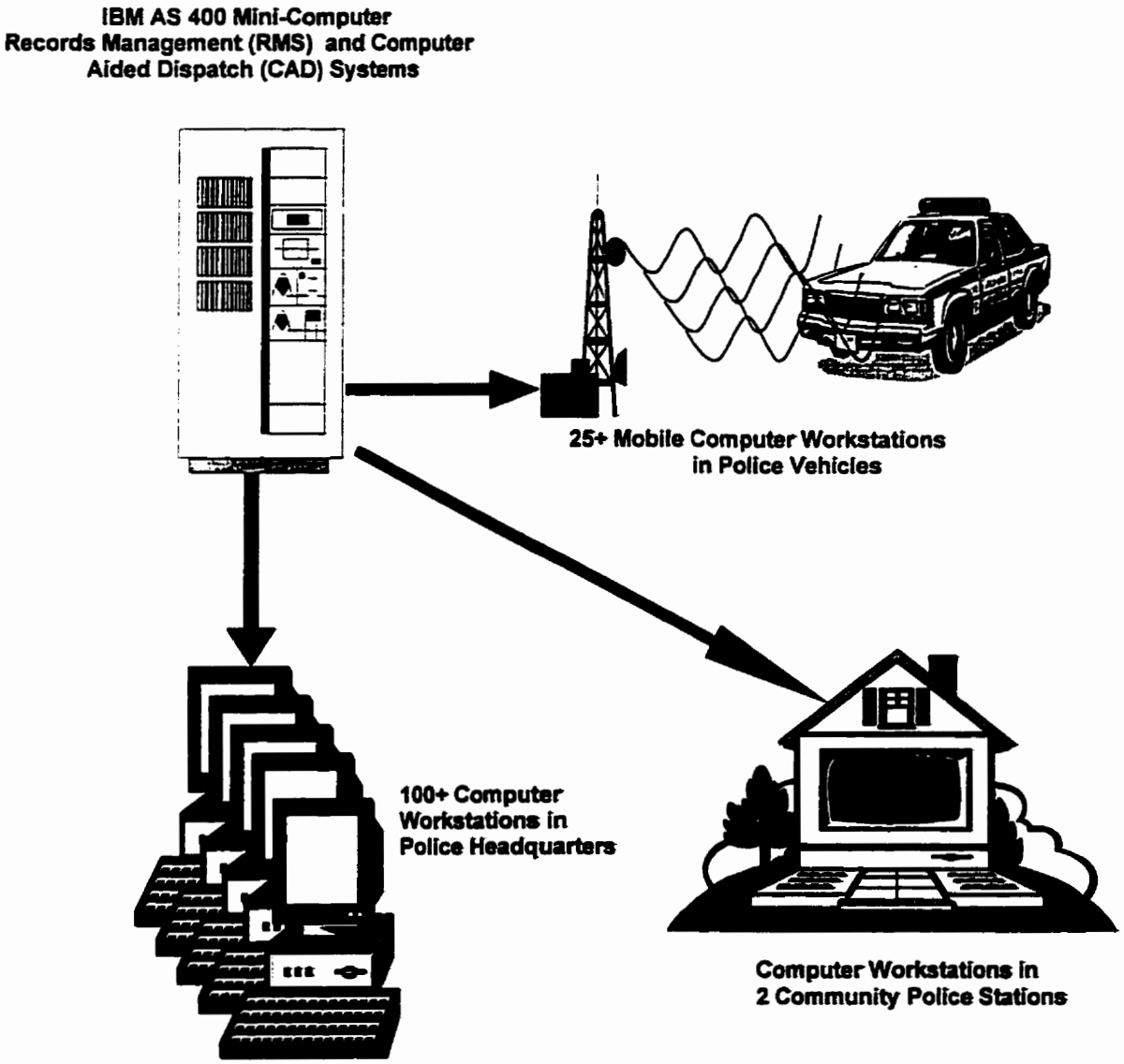
APPENDICES

Appendix (a): Organizational Chart of Victoria Police Department (Victoria Police Department, 1997b)



Appendix (b): Victoria Police Department Information Network

Figure #2
Victoria Police Department Information Network



Appendix (c): Mapping Interface Application Questionnaire

Division? Patrol__ CPD___ Traffic_ Dets.__ Other__

1. Do you think a mapping program is a useful tool for operational members?

   Yes / No

   Why:

   _____

   _____

2. What are the incident types you feel would be beneficial to see in a mapped display? (Fights, Panhandler etc.)

   _____

   _____

3. What details for each incident type would you want to be displayed? (e.g. Theft from Auto – vehicle make, year etc.)

   _____

   _____

4. How often would you use a mapping program with the features you have listed?

   Several times per shift___
   Once per shift ___
   Once per block ___
   Never use it ___

   Comments:

   _____

   _____

Please forward completed questionnaire to Research, Audit and Analysis Section. Thank-you.

Appendix (d): Focus Group Participant Consent Form

Victoria Police Department Mapping Interface Project
Participant Consent Form

As outlined by the Project Co-ordinator, the purpose of this session is to determine the requirements and specifications for the Mapping Interface Computer Application. The results from this session will be used for two purposes. First, the data will be used to draft the request for proposal for the proposed computer mapping application. Second, as part of the Project Co-ordinator's course of study in Leadership and Training, the results will be discussed in the final project report, which will be submitted to the Victoria Police Department, and Royal Roads University.

Please read the following carefully. If you wish to participate in this session, please indicate so by signing below:

- All information obtained in this project/study will be kept confidential in a safe and secure manner by the researcher/participant.
- The project/study will not identify you in any way.
- The faculty advisor from Royal Roads will have access to the cumulative data but not your identities.
- Questions and comments about the research process are welcomed at any time by you.

Participant Name_____

Participant Signature_____

Thank you for your participation in this project/study.

Project Co-ordinator_____ Date_____

Bob Gehl, Cst# 145
Research, Audit and Analysis Section

Appendix (e): Request for Proposal for Computer Mapping Application

THE CORPORATION OF THE CITY OF VICTORIA
REQUEST FOR PROPOSAL NO. 254
MAPPING APPLICATION INTERFACE TERMS OF REFERENCE

EXECUTIVE SUMMARY

"A picture can say a thousand words...."

This report will outline the proposal for the development and integration of a mapping interface to the existing HTE automated information management system used by the Victoria Police Department.

The aim of using mapped information is to provide operational members with access to pertinent incident information in a more efficient and timely manner.

There are three objectives to the initial phase of the mapping application:

1. To provide operational members in the field with access to "user defined" mapped information on criminal and non-criminal activities within the City of Victoria.

2. To provide mapped information from the HTE information management system which includes, Computer Aided Dispatch (CAD), and Records Management System (CRIMEs), that will enable operational members to access timely, detailed information to, in turn, assist as an investigative tool for specific incidents.

3. To provide operational supervisors with mapped information that will assist with decision support, for deployment of resources.

The Research, Audit and Analysis Section currently provides mapped incident information to the operational members on a weekly basis. The distributed maps are limited to specific incident types, and a set date range of seven days. The use of a computer mapping application will enable operational members to view incident information from CAD and CRIMEs on a user-defined basis. For example, a member beginning first dayshift can go to a workstation, open the mapping application, and query all the B&Es, or Auto Crimes, for the members' assigned area, for any time and date period that is desired. The ability to see where incidents have occurred in a mapped format provides a snapshot for decision support to where routine patrols should be directed. All call types that exist in the CAD database are capable of being queried with the mapping

application. In addition, Location and Movement, and Accident information can be accessed.

Future proposed enhancements to the application are to provide an aerial photo layer that will overlay with the City of Victoria map. This feature will be beneficial as a critical incident management tool, and as an investigative tool.

The application can be accessed through a workstation on the existing departmental network. It is proposed that the initial application be deployed to ten workstations that are utilized by operational members in Patrol, Detectives, Community Policing, and Traffic Divisions. The sites will include the two community stations, with access to the network through telephone modem.

The design of the application will allow it to be adaptable to any CAD/RMS used by police agencies. The applications' program language must accept several common file formats that will run in conjunction with MapInfo. Any future modifications or changes to the existing Records and CAD databases will be adapted to the application. With this in mind the application can potentially be "piloted" by the Victoria Police Department, for future consideration in use by the E-Comm Project underway in the Lower Mainland.

Training for the application can be conducted through "roll call" training with on-duty members. Follow-up training can be completed on an individual basis as needed.

The evaluation for the use and performance of the mapping application will be ongoing. Measurement indicators for the application will be based on the number of times the application is used monthly, in conjunction with user's comments on the application's assistance in the performance of their duties.

1.0 INTRODUCTION

This report will outline the integration of a mapping application interface to the Victoria Police department's existing Computer Aided Dispatch (CAD), and Records Management System (CRIMEs).

Three objectives can be met with the integration of a mapping application to existing police information systems:

- To provide operational members in the field with access to "user defined" information on criminal and non-criminal activities within the City of Victoria, in both geographic and text-based format displays. Users are able to define date, time parameters, along with specific incident types they wish to view.

- To provide information from CAD and CRIMES, that will enable operational members to access timely, detailed information to, in turn, assist as an investigative tool for specific incidents, and as an information source for directed routine patrol duties. The current method of extracting this information is often time-consuming due to the volume of information that is required to be viewed in a "text only" format.

- To provide operational supervisors with decision support, for deployment of resources, based upon information displayed in a geographic format. The mapping application allows the user to define information to obtain a "snapshot" in a graphical format, of what incidents have transpired over a given time and date range.

2.0 BACKGROUND

In January of 1996, the Victoria Police Department introduced crime analysis as a means to identify, and target, criminal and non-criminal activities, within the City of Victoria. Crime analysis itself is a process by which information on criminal and non-criminal activity is collected, collated, analyzed, and finally distributed to the members of the Victoria Police Department. The information on current crime trends and activities can then be used in the formation of operational plans, to deal with each specific problem, or trend that arises. An operational plan may be as simple as the deployment of a patrol unit for directed patrols to a problem area, or a more complex plan such as a task force to deal with a specific crime series.

The information used for crime analysis reporting is collected, and stored, in the Computer Aided Dispatch (CAD), and Records Management System (CRIMES) databanks, which are managed by an IBM© AS400 computer. The stored information is downloaded, and manipulated using a PC-based spreadsheet and desktop mapping applications. These applications allow the data to be examined and queried to determine existing patterns, and crime trends.

At this time, the Research, Audit and Analysis Section distribute mapped information on specific criminal activities such as property crime, and auto crime on a weekly basis. The primary objective of integrating a mapping interface to the existing information system is to provide the distributed information, as well as other types of information, to the operational member in a more efficient, and timely manner.

The City's Engineering Information Services Department provides the mapping files used by the Victoria Police Department.

3.0 APPLICATION FEATURES

The application must contain the following features:

- Application is written in to run in conjunction with MapInfo Desktop Mapping Program. The application is capable of being customized to changing user needs. The City will be responsible for purchasing MapInfo Licenses for the application.

- User can select date and time ranges, call type(s), as well as other parameters relevant to the specific information type, e.g., select date and time ranges for B&E, along with premise type, point of entry type, suspect actions, property types, etc.

- Details of each record can be viewed in a "browser" (spreadsheet format in text format of each incident), as well as each individual record viewed on map with information tool.

- Multiple layers can be viewed at one time, e.g., Break & Enter layer can be viewed in conjunction with L&M layer for same date time ranges.

- Displayed information can be printed out.

- Provide a CAD and RMS that is capable of storing co-ordinate information (longitude and latitude) for mapping for dispatch functions.

The application will provide "*user defined*" access to date and time parameters for the following incident types:

1. Auto Crimes (Stolen Vehicles, Theft from Vehicles, Recovered Stolen Autos).

2. Traffic Accident/Enforcement information.(Information from Accident and Violation Ticket Tracking modules).

3. Property Crimes information (Residential and Commercial Break and Enter).

4. Location and Movement information (Persons checked relative to incident locations).

5. General CAD information (Information on a variety of CAD Call types for resource deployment, e.g., Assaults/ Disturbances/Panhandler etc.).

Future enhancements include the ability to access aerial photos of the City that overlay to the linear map. This feature will be beneficial for critical incident management, and as an investigative aid. The City's Geographic Information System (GIS) Strategic Plan includes the implementation and use of aerial

photography for Engineering, and Planning applications. The aerial photo data that is planned for this use, can be shared with the Police Department, similar to the City address data that Engineering currently provides to the Police Department for crime analysis. The proposed application, and the information it can provide, can potentially be accessed through a mobile workstation.

4.0 APPLICATION ADAPTABILITY

The application will be designed to work in conjunction with MapInfo and be adaptable to any automated CAD and RMS system that a police agency may use.

Upon researching the E-Comm Project underway in Vancouver, there are provisions in their RFP that the vendor will provide a CAD and RMS that is capable of storing co-ordinate information (longitude and latitude) for mapping for dispatch functions. At this time there is no provision in the E-Comm RFP for a mapping application that can be used as an operational / investigative tool. The proposed application can potentially be utilized to meet such a provision.

5.0 APPLICATION TRAINING AND SUPPORT

Over the course of the demonstrations, several members commented that for the application to be utilized, it must be simple to use. With this in mind, the application will have several basic functions that will allow the member to zoom, pan, and select specific call types and search parameters.

With the simple functions available, it is anticipated that training requirements can be carried out through either "roll call" training, or while members are on duty, training several at one time. The Supplier will be responsible for providing a four hour training seminar to approximately 6-8 City members, so that they in turn will be able to train the remainder of the Police members.

6.0 FUNDING FOR MAPPING APPLICATION

Victoria Police Department has received funding for the pilot project through the Insurance Corporation of British Columbia (ICBC) Auto Crime Strategies Grant Program.

7.0 PROPOSAL SUBMISSION REQUIREMENTS AND EVALUATION CRITERIA

The following items should be included in your proposal submission and will be the basis for evaluation:

Implementation Plan

Phase 1:

Piloted by Victoria Police Department, the first phase will consist of 10 sites including two community police stations. The solution will provide user defined access to information residing in modules within the HTE information management system.

Vendor will provide a fully functional solution, implemented on or before March 1st, 2000. Intention to pilot the mapping application for one year, at which time the program will be evaluated

Phase 2:

Incremental approach to provide other police agencies with access/input to mapped information on incidents occurring within Capital Regional District.

Qualifiers

The following qualifiers are used within this document to describe how a section or an individual requirement will be evaluated.

Mandatory: Vendors must respond to all RFP items identified as *mandatory*.

Requirements identified as *mandatory* are classified as critical to the operation of the mapping application. They represent features that the participating police agencies cannot function without.

Failure to respond to the requirements in the *mandatory* category may result in elimination of the vendor's proposal due to non-compliance.

Highly Desirable: Requirements identified as *highly desirable* are classified as important to the operation of the mapping application, but on a level of less criticality than those requirements identified as *mandatory*.

Desirable: Requirements identified as *desirable* are not critical to the operation of the participating agencies, but represent helpful or convenient features that would be of operational or administrative benefit to the project participants.

System/Functional Requirements

Solution will be adaptable to all existing police information networks. These include Windows NT© and Novell©. ***(Mandatory)***

Solution will be capable of interfacing to MapInfo Professional software program. Victoria Police Department, Saanich Police Department, Vancouver Police Department, and Delta Police Department use MapInfo. ***(Mandatory)***

Solution will take advantage of an open communications network for data sharing. The need exists today and will increase in the future to communicate and share data/information amongst local police agencies. Solution must support data transfer through ODBC. ***(Mandatory)***

Solution will use Graphical User Interface (GUI) technology standards. ***(Mandatory)***

The solution must be based upon a "user friendly" user interface that provides access to frequently used functions via a single key stroke or mouse click. ***(Mandatory)***

Solution will be capable of operating on a network with minimum Pentium class PC workstations. ***(Mandatory)***

Solution will support multiple users accessing the information through the application on a concurrent basis. ***(Mandatory)***

The solution must allow the user to print any system response, both graphical and text based information. ***(Mandatory)***

Solution will provide a set of icons/tools, to provide the user with easy access and manoeuvrability within the application. Using MapInfo icons/tools as a term of reference, the following tools are required: Zoom In/Out, Grab Tool, Information Select Tool, Marquee Select Tool, Radius Select Tool, and Change View Tool. ***(Highly Desirable)***

Solution will be capable of extracting data from multiple ASCII files, queried from the Victoria Police Department HTE information management system, which will reside in a common information folder. ***(Mandatory)***

Solution will allow the user to perform queries from multiple ASCII files residing in the query folder, for concurrent display on map. For example, a user may query theft from vehicle incidents, and suspicious person incidents and display both call types concurrently on a map. User will be able to distinguish the two call types based upon different symbols, and colours for each incident type. ***(Mandatory)***

Solution will provide incident symbols which will display/identify where multiple incidents are associated to a single address on the map. ***(Highly Desirable)***

Solution will provide a legend for the symbols represented in the mapped display. ***(Highly Desirable)***

Solution will plot the incidents based upon latitude and longitude information extracted from co-ordinate fields within the query folder. ***(Mandatory)***

Solution will conform to user access security provisions for the internal computer network of the Victoria Police Department. Solution must provide user identification and password protocols to access application. ***(Mandatory)***

Solution will provide administrative access to the application statistics on number of times program is accessed within a specified period. ***(Mandatory)***

Solution will be capable of performing queries on data housed within the shared query folder. The user will be able to view the query results from the solution ***within three seconds*** of the query being submitted for processing. ***(Mandatory)***

Solution will provide architecture that will allow potential use of orthographic images (aerial photographs), and digital photographs (JPEG files) in the future development of the application. ***(Mandatory)***

Information Query/Display Requirements

The query folder of downloaded incidents will contain the last six months of selected incidents, in an ASCII format. The Information Technology Section of the Victoria Police Department will provide programming to download the selected incidents, and their specific details from the IBM AS 400 micro computer to a query results folder residing on a PC server, in an ASCII format. The information files within the query results folder will be refreshed once every 12 hours.

The solution will allow users to query selected incident types, and view the results in graphical display and text in a browser format, from the incident particulars, which reside in the query results folder.

The following incident types will be downloaded as separate queries to the query results folder, for access by the proposed solution. The solution will provide the user with the ability to conduct Queries on multiple incident types, providing display of the results (multiple layers) on a single map.

Auto Crimes: *(Mandatory)*

Auto crime incidents include: Theft of Auto, Theft from Auto, Recovered Stolen Auto

Query Requirements:

Solution must support queries of single or combination of auto crime incident types. User is able to query by Date Range, Time Range, Vehicle Make, Vehicle Model

Display Requirements:

Solution will display text fields in a browser format of each CAD entry resulting from the initial query. Results will include, but are not limited to: Incident Type, Date, Time, Location, Vehicle Make, Model, Year, Colour, Province/State, VIN#.

- From suspect screen - Suspect Name, DOB/Age, Address
- From Caller Question List - Occurrence Dates/Times, Point of Entry, Property Taken, Rental Vehicle, Recovery Location (if outside Victoria)

Persons Checked / Field Interview: *(Mandatory)*

Persons checked/interviewed on the street by police may be entered into a module within the HTE system called the Field Interview (FIS) Module. The solution must be capable of plotting FIS information, as a layer capable of being overlaid to any other incident type being examined by a user. For example, a user examining theft from vehicle incidents will have the ability to overlay the persons checked through FIS for the same time and date range, to determine if there are any links between the two layers.

Query Requirements:

Solution allows user to query by Date/Time Ranges, Surname and/or First Name of Subject.

Display Requirements:

Solution will display text fields in a browser format of each FIS incident as plotted graphically the following fields: FIS Case #, Date/Time of Check, Location of Check, Reason for Check, Member Submitting Check, Subject Name, Subject Address, Date of Birth/Age, Race, Sex, Height, Weight, Hair Colour, Narrative Information from Check Card

Property Crimes: *(Mandatory)*

The HTE records management system contains detailed property crime information regarding incidents of Break and Enter. To effectively analyze these incidents, investigators require the ability to identify similarities between incidents based upon specific incident parameters over and above time and date ranges.

Query Requirements:

Solution will allow user to query by Date/Time Ranges, Premises Type(s), Point of Entry, Method of Entry, Property Taken, and Suspect Actions

Display Requirements:

Solution will display text fields in a browser format for each Break and Enter as plotted on the map. Fields will include: Incident #, Location, Occurrence Date/Time Ranges, Premises Type, Point of Entry, Point of Exit, Method(s) of Entry, Suspect Actions, Property Taken, Suspect Descriptors, Suspect Vehicle Descriptors, Additional Narrative (255 Characters max.)

Selected Incident Types: *(Mandatory)*

Specific incident types captured within the Computer Aided Dispatch System provide users with useful information toward investigation and resource allocation. The following incident call types have been identified for use within a mapping application.

Arson	Assault	Sexual Assault	Drugs
Found Bicycle	Indecent Act	Liquor Offence	Noise Bylaw
Mischief	Noisy Party	Panhandler	Prostitution
Prowler	Robbery	Intoxicated Person	Theft Bicycle
Theft License Plate	Shoplifting	Youth Gathering	Impaired Driver

Query Requirements:

Solution must support queries of single or combination of CAD incident types. User is able to query by Date Range, Time Range

Display Requirements:

Solution will display text fields in a browser format of each CAD entry resulting from the initial query. Results will include, but are not limited to: CAD Call#, Incident Type, Date, Time, Location, From suspect screen-Suspect Name DOB/Age, Descriptors, Address

Traffic Information: *(Mandatory)*

Traffic information relating to accidents and enforcement resides in specific modules within the HTE information management system. The ability to map accidents, overlaid with enforcement information, can provide useful information for traffic officers.

Traffic Enforcement (Citation Module):

Query Requirements:

Date/Time Ranges, Officer, Activity Type, Citation Type (offence)

Display Requirements:

Date, Time, Offence Location, Offence/Citation Type, Citation Number, Issuing Officer, Activity Type, Violator Name, Address, Date of Birth, Driver License #, Province, Vehicle Information, Method Used (ticket type)

Accident Information (Accident Module):

Query Requirements:

Date/Time Range, Injury/Non-Injury

Display Requirements:

Accident #, Reference Case #, Accident Date/Time. Location, Alcohol/Drug, Injuries, Seatbelt Used, Ticket Type (Offence)

Training Requirements:

Vendor will provide training to selected individuals, who will, in turn, provide training to the users of the proposed solution.