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Ottawa Police Department
Strategic Information Management
System: Phase 1

Comnetix Computer Systems

TECHNICAL REPORT

February 1991

COMNETIX

COMPUTER SYSTEMS

Ottawa Police

Strategic
Information Management System

Phase 1 Report
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1 Abstract

For some time, the Ottawa Police has been a national leader in the use of automation to promote safe, efficient and effective local Police Services to the public. As such, it has implemented an array of systems in the direct support of its line operations. The next large opportunity for benefit to the Ottawa Police from automation is in the realm of executive information systems. The motivation for these systems is clear. In an environment of fiscal restraint, the need for increased effectiveness at all levels of management is emphasized by the necessity for the introduction of additional programs without complementary budget adjustments. Also, the trend towards increased criminal sophistication and more widespread, insidious criminal activities due to such influences as drugs, the impact of the emerging swarm tactics of gangs, etc. is a major cause for concern. These issues bring increased pressure to bear on executives of local police forces in the areas of resource utilization, crime analysis and program cost justification. The opportunity is to use the data retained within the operational systems to yield valuable information that can assist the executive function. This project has been struck to tap the new computer technologies of window based systems to bring systems in support of the executive function through the processing of summary operational data.

2 Project Overview

The purpose of the project is to develop a police strategic information management system for the Ottawa Police. It is the intent of the project to transfer the technologies and strategies embodied in the Royal Canadian Mounted Police developed Comparative Analysis & Resourcing System (CARS) to the municipal police arena. The proposed system is to address police information management and supervisory needs related to strategic, administrative and operational issues.

There are a number of organizations on whose cooperation the success of this project depends:
- the Ottawa Police is to define the user requirements;
- the National Research Council (NRC) under the auspices of the Canadian Police Research Centre (CPRC) is the principal funding agency;
- the Royal Canadian Mounted Police (RCMP) is the technical authority in having their technology transfered to the municipal police community; and

- Comnetix Computer Systems Inc. is the system designer, builder and installer.

The project has been very broadly described in the charter documentation. This has been done in order to ensure that the first phase of the project includes a survey of requirements, and an appraisal of the optimal strategic information management system(s) to specify, design and build in later phases of the project. The first "optimal" strategic information system will be one which has real and enuring value to the management levels of the Ottawa Police, which can be built in a reasonable amount of time, and which can be based on the data available from the operational systems currently in existence within the department.

Having succeeded in providing management and supervisory personnel of the Ottawa Police with information that was previously unavailable, it is expected that the Ottawa Police will continue the thrust of information systems by embarking on a longer term series of projects all dedicated to the improvement of operational control, efficiency and effectiveness through the access and presentation of timely information.

3   Phase One

3.1   Phase Objectives

The first imperative in the successful execution of this project is the refinement of the requirements. The project has been initiated as an opportunity to bring some of the technologies embodied within the RCMP CAR System to bear on the executive information needs of the Ottawa Police. As such, the project is very broad in scope. However, the initial objectives of the project do not have a purely long range focus. Rather, it is important to use the strategies and technologies developed by Comnetix for the RCMP in the direct and immediate service of the management of the department. In meeting this objective, every effort must be made to ensure that the decisions in support of the immediate goals are in line with the overall strategic direction of the Ottawa Police. As a consequence, the major objectives of the first phase of this project are as follows:

1. *Isolate the key management and supervisory information requirements.* The first objective of the project must be to isolate one, or at most a few areas of maximum information value that can be addressed in the short term. This is to be done through the high level survey of the Ottawa Police requirements.

2. *Identify the available sources of raw operational data*

   Once the survey of the high level information requirements has been accomplished, the next objective will be to gain an appreciation of the operational data infrastructure currently available within the Ottawa Police. The information presented by the management information systems, and consequently their value to the Force is constrained by the availability, accuracy, consistency and timeliness of the operational data which underpins these systems. Thus, the second major objective of this phase of the project is to survey the operational data facilities currently available to feed the information system(s) identified as a result of the isolation of the key management information requirements.

3. *Refine the scope of the project*

   The analysis of the availability of raw operational data will serve to define those types of information systems that can and those that cannot be delivered. The third major objective of the first phase of the project, therefore, is to refine the scope of the remainder of the project to those areas of potential interest. These areas will fit within the determined requirements of the executive, management, and supervisory personnel of the Ottawa Police, and will be supportable with raw operational information. The refinement of the scope should be done in such a manner as to provide a clear definition of the potential information generated by these information systems.

4. *System development priorities*

   Having defined the information generation capabilities of the possible systems, the next objective of the first phase of the project is to valuate the benefits to the Ottawa Police of each of the systems. This must result in a prioritization of the systems to be developed, after consideration of:
   - the value of the information in terms of the beneficial impact on the management and control of the department;
   - the complexity of the systems development cycle, and therefore the amount of time and expense to bring the system to fruition; and
   - the potential operational impact on the internal systems and technical staff of the timely collection and preparation of the raw data for integration within the information system.

5. *Recommend directions and plan resources for the next phase*

   Once the valuations have been accomplished, the final objective for the first phase of the project is to recommend a direction for the remainder of the project (i.e., the selection of a system to be implemented) and

establish a resource and project plan for the next phase of the project. Usually, in projects of this type it is found that there may be some changes to the underlying operational systems that would present important opportunities for these systems. It is an objective of this phase of the project to highlight any such changes to the operational systems and indicate the potential value of the changes to all levels of management within the organization. Also, if there are important gaps in the raw data available for the purview of the management systems, those will be highlighted as well.

3.2   Phase Results

3.2.1 Refined Project Scope

As previously stated the overall scope of the project covers a broad spectrum of administrative and operational organizational areas within the Ottawa Police. Attempting to meet these objectives, within the agreed to time frame and financial constraints, has necessitated a refinement of the project scope. To achieve this goal, discussions were undertaken at the senior executive level. These discussions centered around the most critical areas of concern while at the same time looking for the greatest potential benefits. As a result, the scope of the project has been refined to include three critical management areas. These areas, in order of priority, relate to *Resourcing, Crime Analysis and Program Evaluation.*

In qualifying these three areas the following interpretations and guidelines were established:

* *Resourcing*
  The purpose of the resourcing component is to address the question of deployment and redeployment of personnel within all aspects of the operational environment of the Ottawa Police. Resourcing issues in support of administrative functions, major capital expenditure items and personnel equipment related resources are not to be considered at this time.

  Questions relating to where resources (i.e. people) are deployed, how many have been deployed, who has been deployed, the time frame of the deployment (i.e. shifts), the type of work these personnel are involved in, the location of this work, the amount (i.e. in terms of quantity) of work, when this work takes place, how long the work is taking (i.e. person hours associated with the initial

response and follow up activities) and the associated person costs in undertaking this work, are of paramount importance. *Therefore, the Resourcing component addresses the deployment and redeployment of personnel in support of the management of all operational duties (i.e. entities of work). The who, where, what, when, how many and at what cost are the key issues.*

- *Crime Analysis*
  The term "crime analysis" is in a sense a misnomer. It is an established fact the workload directly associated with the investigation of "Crime" represents approximately 20 to 25 percent of the total work undertaken by the operational resources of a Police Service. Prior to proceeding with the user requirements and general design phase for this component, it was necessary to establish a mutual understanding of what was intended by the term " Crime Analysis". One of the stated criteria of the department, in support of their Resourcing strategies, was to be able to identify all types of work their personnel are involved in. In view of this decision, it was necessary to consider expanding the scope of the interpretation of the word "crime" to encompass all aspects of work. *Therefore, a decision was made that the Crime Analysis component would address the capability of analyzing all entities of operationally related work undertaken by the Ottawa Police.*

- *Program Evaluation*
  The program evaluation component primarily refers to the Community Based Policing strategies currently being implemented by the Ottawa Police. The introduction of Community Based Policing within policing organizations is a relatively new initiative and at this time the known qualifiers available to evaluate the effectiveness of these programs is limited. Community Based Policing strives for a balance between reactive and proactive policing methods. Community Based Policing calls for extensive involvement and interaction at the community level and addresses such issues as crime prevention, public education, referral and social order maintenance. These programs can have as their roots, political motivation, specific and generally applied community related programs, business sponsored initiatives and internally promoted programs, etc. The ability to evaluate these programs to ensure efficient and cost effective use of resources within an environment of fiscal constraint is paramount to the management of the Ottawa

Police. *Therefore, the primary thrust of the program evaluation process is to provide a means of accessing the value, costs and workload impact of the programs undertaken in support of the Community Based Policing strategies. While the initial emphasis has been at the Community Based Policing level, other supportive program initiatives such as the "RIDE" Program, the "TIPS" Program, etc., are not to be forgotten.*

3.2.2 Base System Components

This section strives to outline the fundamental components of the strategic information management systems. The strategy of these information systems is to be based upon the actual live data produced by the operational computer systems. Yet, the preemptive consideration is the minimization of the impact on these operational systems by the need for data to feed the management systems. The most important issue is to ensure that none of the work on a management information system impacts the level of service of the current automation for the Field officers during the course of their duties.

The philosophic design of the strategic information management system must therefore be based on a scheme that minimizes the impact on the operational computers and systems currently in use. A number of approaches could be employed in this regard. If cost were not an issue, the best way to gain access to the live database would be to cluster a separate Vax processor on the operational system. The use of clustering would permit the new Vax to gain access to the live database of the operational systems in real time without impacting those systems. The management information systems could operate on this new Vax processor using the clustering to gain access to the live database. The responses to the executive/management queries would therefore include all operational data up to the precise time of the query. All data would be fully up to date, yet the impact on the operational systems would be minimized. The system would require that intelligent workstations be used to display the query results and manage the window based user interface. The difficulty with this approach, however, is the cost and impact of the new Vax processor.

In view of this, the recommended approach would be to prepare summaries of the operational data during off peak periods on the operational computers and download these summary files to the strategic information management system workstations. The queries of the executives, managers and supervisors could then be satisfied on the desktop, without any impact

on the operational systems. Important coordination must be established with the operational systems to ensure that the data sets they export are in a format suitable for the management information systems. Also, the downloading of the data must be controlled to ensure that the impact on the police network is kept to a minimum.

The benefit to this approach is that the impact on the operational systems is minimized and each of the information systems workstations can operate independently. Once the data is downloaded to the desktop, the queries issued can be satisfied without impact. The detriment to this approach is the requirement to prepare a download data set. This will involve processing resources at the operational computers. However, the timing and frequency of this processing is under the full control of the department. The more frequently it is done, the more current the data will be at the workstations but pending when the processing and downloading is done, the greater the potential impact on normal operations.

3.2.3 Basic Output Requirements

As described above, clear direction has been received from the executive with respect to the most important areas of emphasis in the investigations of possible executive and management based information systems. Three broad areas have been identified. The purpose of this section of the Phase 1 report is to describe in general terms the types of outputs that would ideally be available from the system. The potential outputs from each of the three areas is described separately below. The identification of those areas that realistically could be driven by the existing operational data systems is left to the following section.

1. Resource Utilization Analysis
   The direction provided by the Ottawa Police is that the outputs from a management oriented information system dedicated to the analysis of resources should focus solely on the operational staff resources, as opposed to administrative staff, equipment, vehicles, etc. The fundamental intent of all outputs derived from a system of this type is:
   • to describe the work that the operational police officers are performing;
   • to determine the most effective deployment of new resources;
   • to plan the redeployment of existing resources in the event of temporary or permanent reassignment; and
   • to determine required levels of staffing to achieve desired levels of service.

When the objective of the system function is to describe the work officers are performing, one is considering the notion of resource utilization. The analysis is focused on the idea of describing where the department is expending its resources. In this analysis, the most natural type of display vehicle is either to use a series of colour coded areas on a map, or a bar chart. The system must first permit the user to select a set of data on which to operate. Thus, the user must be permitted to select an occurrence/incident, a unit, a type of work, or a type of occurrence/incident. Then the user should be required to indicate a date range and a level of geography. The date range is used to constrain the universe of discourse, while the level of geography is used to establish a granularity of analysis. For example, if the user elects to perform the analysis at the Divisional level, then the display will only consist of the three Divisions. At the other extreme, if the user elects to perform the analysis at the Atom level, then the display will consist of all the defined atoms.

Once the criteria and output granularity have been established, the system will display either the bar chart or the map highlighting the data selected. When the output is requested in the form of a map, it will show the areas at the selected level of geography outlined and coloured to indicate the related consumption of resources. If the area is a large consumer of resources, then its colouration would be red. An average consumer of resources would be coloured amber and a low consumer of resources would be coloured green. The terms "high", "medium" and "low" are typically calculated by considering the average and standard deviation of the resource utilitizations within all the considered areas. All those falling above one standard deviation unit from the mean are deemed "high". The symmetric criteria is applied to the determination of "low".

When the output is requested in the form of a bar chart, the system will paint one bar per area, applying the same criteria as described above to the selection of colouration. In addition, the intrinsic nature of the bar chart itself ensures that the magnitude of the resource utilization is reflected in the size of the bar. The bar is to be painted horizontally, with each area under consideration as a separate horizontal bar. For each area, the system will also display the area identifier (i.e. Division number, zone number or atom number) and the calculated resource utilization.

The user will have the option of switching between these two types of displays without reprocessing the query. In window based systems, this is typically done by using separate windows for each of the two types of displays and allowing the user to toggle between them at will.

The measurements of "resources" alluded to above must consider a number of metrics. The metric that is most immediately obvious would be the person hours expended. However, the user should be equally able to use other metrics, such as number of calls serviced, number of occurrences/incidents serviced, or the operational staff salary costs expended. It is expected that the specific definition of all the metrics required will be addressed with the users in the next phase of this project.

2. *Resourcing Calculations*

When the objective of the system function is to determine theoretic resourcing levels, or calculate the optimal reallocation of resources then one is considering the use of resourcing calculations. This type of analysis is focused on the mathematical resolution of a number of issues:

- calculate the theoretic number of resources needed for certain levels of service at a specified level of geography at a specified hour of the day, or day of the week, given a certain demand model;
- provide a queueing model of the sequence of application of available resources to geographic areas at a specified level of geography;
- analyze the potential sources of resources from the Field when emergencies or special requirements arise that require the temporary reallocation of resources. In other words, determine what areas can give up resources and still maintain a homogeneous level of response to calls for service.

The outputs from this type of information system typically do not lend themselves easily to a graphic type of display. At a trivial level, one could display a map depicting the various areas at a selected level of geography and colour the areas that should give up resources in one colour and use another colour for those areas that should gain resources. If this type of strategy is used, there must be an ancillary capability for the user to select an area using the mouse. Once an area is selected, the system will produce a small window that details the numerics associated with the analysis. This should include the actual number of resources, the queue position, etc.

If a strictly numeric output format were to be used, then the system should order the areas according to queue position, concurrently providing the resource numbers as calculated by the resourcing algorithm.

3. Event (Occurrences/Incidents) Analysis

The fundamental intent of this type of executive analysis is to determine where the calls for service or incidents are taking place. As this implies, it can be fed either from the Computer Aided Dispatch environment, from the Records Management environment or from both environments. When based on the data from CAD, the system relates to the varying densities of calls for service over a number of independent variables. On the other hand, when the system uses the RMS data as its foundation, it relates to the relative densities of occurrences. The term "event" is used in the title as a generic term, including both calls for service (i.e., incidents) as well as occurrences.

The key to this type of strategic information system is flexibility and ease of use. There must be a tremendous level of selectivity and control over the presentation for the user. Yet, these facilities must be packaged using technologies and strategies that promote simplicity of the user interface. It is considered that the typical user of this system will not spend a significant proportion of their time using a computer. Therefore, careful human interface design is necessary to ensure that the steps needed to complete a request and secure the desired output are few and obvious.

The selectivity of the system must permit the user to define the universe of discourse easily. This, at least, must consist of the selection of one or more event codes, event group codes and event date/time range. In addition, any significant fields found within the base data should be available for use to restrict the records to be included in the analysis. For example, the user may wish to consider only events which took place on a specific day or days of the week. It is expected that any such "significant" fields will be defined during subsequent phases of this project.

Having designated the events to be summarized in a report, the format of the report should be selected by the user. As above, the user must be able to move across the various reporting formats without redevelopment of the report. The system will present the output in the form of:

- a density coloured map of areas;
- an icon scatter plot;
- a bar chart of areas showing relative densities;
- a pie chart of areas showing relative densities;
- a time of day bar chart or clock chart;
- a day of the week bar chart.

The notion of the interchangeability of density coloured area maps and bar charts has been discussed above. The idea can easily and naturally be extended to include exchange into pie charts. These charts can be more effective in cases where a small number of comparands are being examined. The icon scatter plot is used to locate the selected events at the proper points on a street map. This is a more refined, detailed view of an area that has an unexpectedly high density of occurrences. It shows the actual location of the various events that were selected. As with the pie chart, this type of output format loses its impact if the number of events/icons on the map becomes too great.

There is a new dimension that should be considered for inclusion in the output reports from the event analysis component of the information system. Even the most advanced systems available today typically fail to provide the user with the opportunity to easily establish ranges of the dependant variable for analysis. Specifically, although the RCMP CAR System will permit the user to select the type of report and the types of events to summarize, it includes all subareas within the selected area. It is proposed that the Ottawa Police Strategic Information Management System emphasize this new facility.

When the user has selected the events to be summarized, it will be possible to then designate the desired ranges of the dependant variable. For example, the user will be able to designate events in certain areas. Additionally, the user will be able to establish ranges of time in the day which should be considered together. Using this type of facility, the user will be able to compare the density of events across shifts, or across potential shift schedules. Of course, the system must still provide a default "ALL" option, so that the user can opt to consider all found areas or time of day without additional specification. It is expected that this type of capability will prove extremely powerful in the analysis of events.

4. *Program Evaluation*
This type of executive analysis is oriented towards the evaluation of the effectiveness of certain types of programs, such as Bicycle Patrol, etc.

It is expected that each program will demand a different type of
analysis. Therefore a detailed description of the outputs is not possible.
However, the class of outputs will adhere to those described above.

.c3.3.2.4   Basic Data Sources

The basic data sources required to permit the development of the
Resourcing, Crime Analysis and Program Evaluation components are as
noted below. In many instances a data source is required for support of
more than one component. Therefore, the applicable component(s) have
also been identified:

1. *The creation of a unit hierarchy within the organization structure of the
   Ottawa Police.*
   This facility permits the unique identification of any "unit" within the
   organizational structure. Subsequently, the unit identifier acts as the
   key for attaching personnel to the unit. The creation of a unit hierarchy
   also allows for the roll up of data at any level within the hierarchy and
   provides for the comparison of activities across like units. (Primarily
   required in support of the Resourcing component).

2. *The creation of a unique identifying numbering system for all
   personnel.*
   This facility provides for the unique correspondence of members to
   units (i.e. from an organizational point of view - the assigned to unit).
   Once a member has been attached to a unit through this unique
   identifier, it is a simple task to conduct workload analysis at the member
   and unit levels. The unique identifier is also used to track members
   from a deployment/redeployment point of view. (Primarily required in
   support of the Resourcing component).

3. *The shift scheduling data.*
   In most instances the shift scheduling component provides for the
   allocation of resources in a controlled manner and within a given work
   zone. The shift scheduling component is also used for the
   allocation/scheduling of resources to meet special circumstances (i.e.,
   demonstrations, VIP visits, etc.). The resultant shift schedules are
   useful to the executive information systems because it will provide for
   the allocation of work to the assigned officers (i.e., the officers on
   shift). (Primarily required in support of the Resourcing component).

4. *The creation of patrol zones (geographic boundaries of work) based on the identification of areas within the geographic boundaries of the .*
The creation of patrol zones permits the assignment of members to specific work areas and provides the capability of analyzing the how many, type of work and the location of the work that members undertake within these areas. (Required in support of all three components).

5. *The creation of a standard event classification structure. As a secondary option, the direct correlation between the CAD incident based codes and the records management system (occurrence based) crime classification codes.*
This common event classification structure permits the identification and analysis of all the entities of work undertaken by the under one standard naming convention. The alternative of using an identifier as a direct correlation between the CAD codes and the Record Management (Crime classification) codes will in essence achieve the same goal but will require the additional step of mixing the two data sources before either the resourcing or crime analysis aspects can be met. (Required in support of all three components).

6. *The recording of all work under one common numbering system.*
The usage of a common numbering system for CAD related calls for service and Records Management occurrences would assist in the integrated consideration of work currently being recorded under the two separate operational systems. Given that the strategic information management system should provide a complete view of the work undertaken by the Field members, this is an important consideration. While not absolutely required to permit any of the components to *"work"* , a common numbering system would definitely be of value in the efficient correlation, analysis and the integrated presentation of data from these three components. Also, the initiation of a common numbering system complements the establishment of a standard naming convention for all entities of work.

7. *The development/implementation of an area based geographic component.*
   This facility would permit the geographic display of atoms within zones and subsequently the identification of the workload within each atom. This strategy would apply to the creation and display of any of the geographic areas within the Ottawa Police. The atom identifier would be the key to identifying work that took place within the geographic boundaries of the atom, the geographic boundaries at the program level and subsequently, the workload at any level within the Organizational hierarchy. (Required in support of all three components).

8. *The development/implementation of street level mapping for the management and presentation of geographic based data.*
   Street level mapping considerably enhances the presentation and analytical capabilities for all three components. The ability to view the locations of events within zones within specific date/time ranges would greatly enhance the crime analysis capabilities of the department. Also, street level mapping provides the ability to asses the zone geography and the deployment/redeployment strategies of the resourcing component associated with this geography. This data is normally derived from the Area Master Files offered by Statistics Canada. There will likely be a requirement for ongoing updates from Statistics Canada through the use of an internal technical capability. (This facility is primarily required in support of the Resourcing and Crime analysis components. While not directly required in support of the Program Evaluation component, street level mapping would be a definite asset in evaluating the impact of specific programs).

9. *Integration of the CAD System Incident Reporting and Dispatch/Status Keeping Statistical data and the Records Management Occurrence based data.*
   The marrying of the CAD related data with the Records management data would provide a complete picture of the work performed by the regardless of the source of this work. (While not directly required in support of any of the components, this integration would provide the capability for a coordinated analytical approach within an integrated architecture).

10. *Personnel costing data.*

The association of personnel costing data to the person hours expended in relation to an event or to like types of events is required to establish person costs associated with workload. The costing data must reflect the variances in the amount of pay attributed to different categories of working hours and conditions (e.g. normal pay, overtime pay, shift differential pay, special pay, etc.). (Required in direct support of the Resourcing and Program Evaluation components). The application of costing data to the Crime Analysis component would be very beneficial in assisting management in establishing policy/procedures relating to the amount of work to be undertaken for certain event types (e.g. Personnel will no longer attend non-injury motor vehicle accident events unless the estimated damage exceeds $2,000.) and in costing special event activities (i.e. demonstrations, VIP visits, etc.) for impact analysis and cost recovery and budgetary purposes.

11. *The development of a generic person hour reporting system primarily based on event types. The capability should also exist to charge person hours at the event record level to address the requirements of associating person hours to special events.*

The recording of person hours against event types and in specific instances against the event itself will permit the department to determine how much time is being spent against all categories of work. This facility will also provide the capability to compare the hours expended against like activities across geographic boundaries and across organizational boundaries. (Primarily required in support of the Resourcing and Program Evaluation components. Required in support of the Crime Analysis component if the costs associated with the enforcement/prevention, etc., of crime types is a factor).

12. *The migration of the person hour reporting system from recording person hours predominantly at the event type level to reporting all person hours at the event record level. This migration should only be considered at a time consistent with the introduction of field level electronic data capturing capabilities.*

This facility will permit a more detailed evaluation of the usage and cost of resources. At the initial installation of the resourcing analysis systems, the man hour reporting system could be maintained only at the level of the type of system. Thereupon, it will be possible to compare the amounts of time spent on different types of events within various

geographic areas. However, if there are anomalous results, it would not be possible to delve more deeply into the data within one specific type of event. By relating the man-hours expended not to an event type, but back to a specific event, it would be possible to perform a detailed audit of the person-hours expended. One may note that this also will require an integrated numbering system between CAD and RMS as described above and also a common event coding structure.

For example, most major crimes are solved within a relatively short period of time. If not, they will require a great deal of investigative resources and time to solve, if they are solved at all. If the man-hours could be assigned to specific investigations of this type, rather than against robberies, murders, etc., in general, then it will become possible to analyze the types of factors which contribute to a larger number of person-hours.

3.2.5 Potential Problem Areas

1. A formalized unit hierarchy is not in place within the organization structure of the Ottawa Police.
The establishment of this unit hierarchy for the Ottawa Police is a prerequisite to the successful implementation of Strategic Information Management Systems that are based on integrated data management strategies. This hierarchy could follow the current organizational structure of the department and would not be a major undertaking.

2. Unique identifying numbering system for all personnel.
It is proposed that the member badge number, employee number or payroll number act as the unique identifying number for departmental personnel. This unique number exists and is in use throughout the organization. It is anticipated that this requirement including the attachment of personnel via this unique identifier to the unit hierarchy could be supported through minor enhancements to current system facilities.

3. Shift scheduling data.
Shift scheduling data is available throughout the Organization but the allocation and management of work assigned is only available through the CAD environment and only for the Patrol Sections. Also the

allocation of work assigned only relates to the initial instance of response and does not address any follow up activities.

4. *Patrol zone geography.*
Patrol zone geography is in place and in use throughout the jurisdiction of the department. The geographic hierarchy for the consists of the Force, Divisions within the Force, Patrol Zones within Divisions and Atoms within Patrol Zones. Therefore, the lowest level of display is within the geographic boundaries of the atom. While the atoms are identified through a unique atom number, the geography of these Atoms, Zones or Divisions has not been found to be available in machine readable format.

5. *Creation of a Standard event classification structure. As a secondary option, the establishment of a direct correlation between the CAD Ten-Code System codes and the records management system (occurrence based) crime classification codes.*
There are two event classification structures in use in the Ottawa Police. The Ten-Code System is used to identify all activities recorded in the Communications Centre environment (CAD). The Crime Classification System is used to identify the occurrences recorded in the Records Management System. At this moment a direct correlation can be made between the incidents identified in the CAD System that result in occurrences being created in the Records Management System. This means that a comparison and amalgamation of event classifications can be accomplished. This also means that duplicate reporting (i.e. the capturing of an event in the CAD System and the capturing and counting of the same event in the Records Management System) can be avoided.

A preliminary review of these coding systems indicates it would be very difficult to create a one to one relationship between the CAD Ten-Code System and the Crime Classifications in order to identify all entities of work. This will require a further review, but in all probability, adjustments to the coding structures should be made.

6. *The recording of all work under one common numbering system.*
The usage of a common numbering system for calls for service and occurrences would assist in the integrated consideration of work currently being recorded under the two separate operational systems. Given that a strategic information management system should provide a

complete view of the work undertaken by the Field members, this is an important consideration. It is not clear at this time what the potential impacts might be on the operational systems of this requirement for a common numbering scheme.

7. *The development/implementation of an area based geographic component.*

   This facility would permit the geographic display of atoms within zones and subsequently the identification of the workload within each atom. This strategy would apply to the creation and display of any of the geographic areas within Ottawa Police. The atom identifier would be the key to identifying work that took place within the geographic boundaries of the atom and subsequently, the workload at any level within the Organizational hierarchy. The area geography requires the definition of the areas in use at the (Atoms, Zones, Divisions) in terms of a series of coordinates. The coordinates should be in one of the accepted cartographic systems, such as the UTM (used predominantly by Statistics Canada in their Area Master File) or lon/lat (as used by Energy, Mines and Resources). The system employed must describe Cartesian coordinate system with identical scales in both axes.

8. *The development/implementation of a street level mapping geographic data.*

   Street level mapping considerably enhances the presentation and analytical capabilities for all three components. The ability to view the locations of events within zones within specific date/time ranges would greatly enhance the crime analysis capabilities of the Ottawa Police. Also, street level mapping provides the ability to assess the deployment / redeployment strategies of the resourcing component. This data is normally derived from the Area Master Files offered by Statistics Canada. There will likely be a requirement for ongoing updates from Statistics Canada through the use of an internal technical capability. The Statistics Canada Area Master File typically offers only two axes of information. If a third dimension were also provided, then the executive information systems could use this data to gauge if terrain type created an impact on policing. For example, is the accident rate markedly higher in areas that enclose steep grades?

9. *The integration of the CAD System Incident Reporting and Dispatch/Status Keeping Statistical data with the Records Management data..*
   The marrying of the CAD related data with the Records management data would provide a complete picture of the work performed by the Ottawa Police regardless of the source of this work. It is not clear how manageable this requirement would be in view of the currently segregated processing of the two systems at the Department. This may be an issue that is best dealt with over time through a migration strategy (i.e. towards the end of a system life cycle rather than through a mid-life integration strategy). Pending the direction resulting from Phase 1, this issue could be subject to further review during Phase 2 of the Project.

10. *Personnel costing data*
    The association of personnel costing data to the person hours expended in relation to an event or to like types of events is required to establish person costs associated with workload. The costing data is a complementary by-product of a Person Hour System. The person costs associated with the hours expended in relation to work must reflect the variances in the amount of pay attributed to different categories of working hours and conditions (e.g. normal pay, overtime pay, shift differential pay, special pay, etc.). It is believed that costing data is available and if a person hour reporting system was in place, person costs could be calculated.

11. *The development of a generic person hour reporting system primarily based on event types. The capability should also exist to charge person hours at the event record level to address the requirements of associating person hours to special events.*
    The recording of person hours against event types and in specific instances against the event itself will permit the department to determine how much time is being spent against all categories of work. This facility will also provide the capability to compare the hours expended against like activities across geographic boundaries and across organizational boundaries. This capability is currently available in the limited sense of the initial response to calls from the CAD System. Strategies should by developed for its full implementation in a manner which minimizes the impact on the operational members.
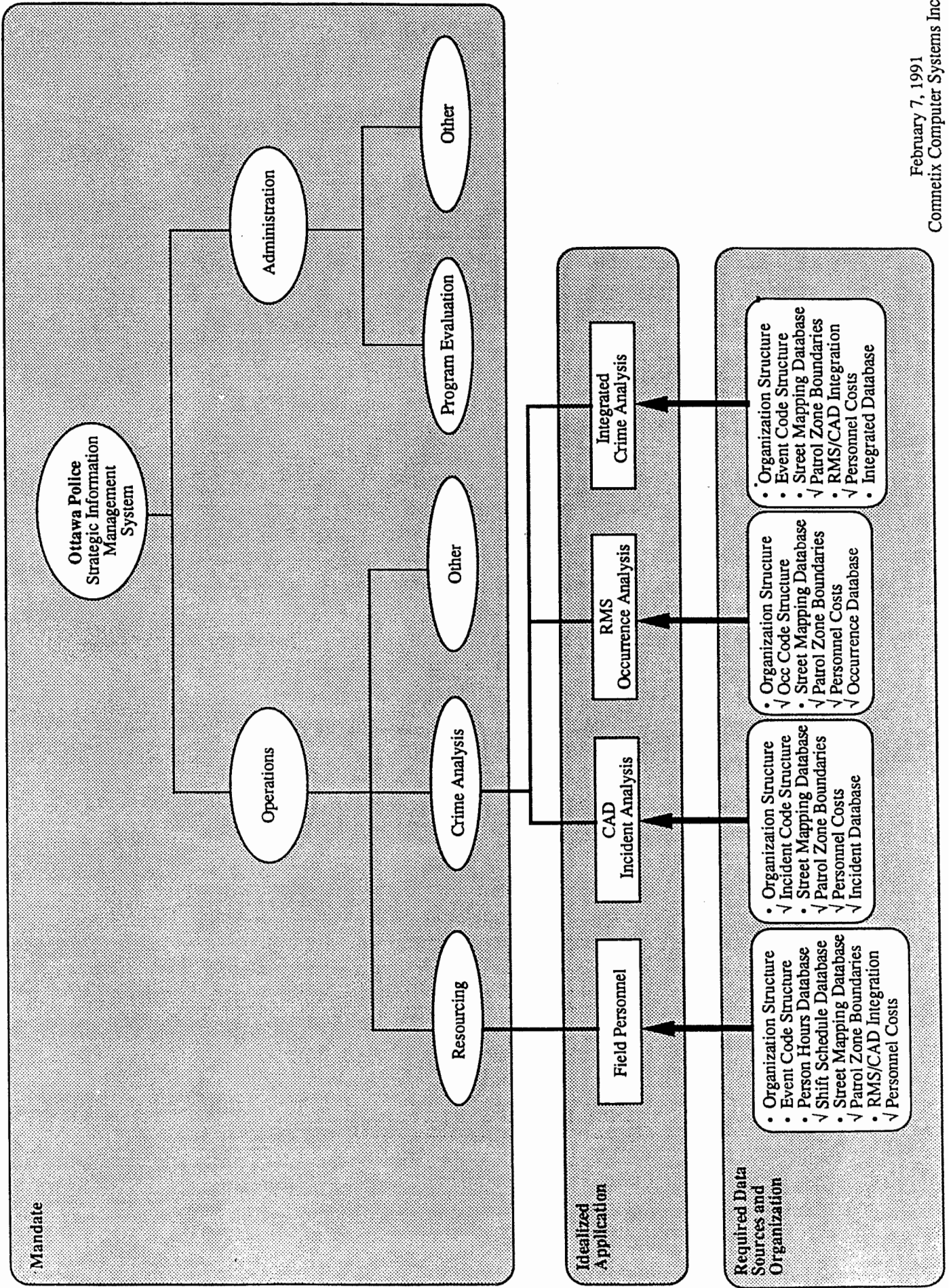
12. The migration of the person hour reporting system from recording person hours predominantly at the event type level to reporting all person hours at the event record level. This migration should only be considered at a time consistent with the introduction of field level electronic data capturing capabilities.

This facility will permit a more detailed evaluation of the usage and cost of resources. At the initial installation of the resourcing analysis systems, the person hour reporting system could be maintained only at the level of the type of event. Thereupon, it will be possible to compare the amounts of time spent on different types of events within various geographic areas. However, if there are anomalous results, it would not be possible to delve more deeply into the data within one specific type of event. By relating the man-hours expended not to an event type, but back to a specific event, it would be possible to perform a detailed audit of the man-hours expended. One may note that this also will require an integrated numbering system and common event coding structure between CAD and RMS as described above. There is no intent to have this item interpreted by the as a problem. The information was recorded as a consideration of future direction.

3.2.6 Evaluation of Information Opportunities

The opportunities for the development of the Resourcing, Crime Analysis and Program Evaluation components of the Strategic Information Management System are determined through three basic criteria. The first issue relates to the identification of the requirements of a particular component. The second question relates to the availability of data within the environment to support the requirement(s) and thirdly, the practicality of implementing additional "data infrastructures" to effectively meet or enhance the desired component functionality. In an attempt to qualify these opportunities, the following chart illustrates the requirements of each component and the availability (depicted through a check mark) of supporting data within the Ottawa Police data management framework. Requirements that do not have a corresponding "check mark" should be interpreted as not currently available in a suitable format or non existent.

Ottawa Police - Strategic Informat.   Management System - Phase 1 Overview

Mandate

- Ottawa Police Strategic Information Management System
  - Operations
    - Crime Analysis
    - Other
    - Resourcing
  - Administration
    - Program Evaluation
    - Other

Idealized Application

| Field Personnel | CAD Incident Analysis | RMS Occurrence Analysis | Integrated Crime Analysis |

Required Data Sources and Organization

Field Personnel
- • Organization Structure
- • Event Code Structure
- • Person Hours Database
- √ Shift Schedule Database
- • Street Mapping Database
- √ Patrol Zone Boundaries
- √ RMS/CAD Integration
- √ Personnel Costs

CAD Incident Analysis
- • Organization Structure
- √ Incident Code Structure
- • Street Mapping Database
- √ Patrol Zone Boundaries
- √ Personnel Costs
- √ Incident Database

RMS Occurrence Analysis
- • Organization Structure
- √ Occ Code Structure
- • Street Mapping Database
- √ Patrol Zone Boundaries
- √ Personnel Costs
- √ Occurrence Database

Integrated Crime Analysis
- • Organization Structure
- • Event Code Structure
- • Street Mapping Database
- √ Patrol Zone Boundaries
- √ RMS/CAD Integration
- √ Personnel Costs
- • Integrated Database

The lack of a "check mark" should not by itself be interpreted as the sole determining factor in the ability to meet or not meet the functional requirements of a component. The degree of difficulty in providing the facility within the current time frame and dollar constraints and the meaningfulness of the end product are probably the key considerations. The last determining factor involves a series of considerations which are intended to establish if the objectives of the component, within the time frame and dollar constraints of the project, can still be met.

3.3   Phase 1 Conclusions and Recommendations

3.3.1 *Resourcing*

In reviewing the missing data sources required to facilitate a Resourcing Component, it becomes very obvious that the most critical data is the relationship of person hours to activities. If this data was available, the question of who, what, the amount of time and subsequently the amount of dollars expended against a particular type of activity per member, as per the organizational structure could be established. This relationship, in the fully generalized sense, is not available and cannot be implemented within the time frame and dollar constraints of the current project. The only supportable resourcing occurs within the initial response captured by the CAD System. This system already provides a number of performance metrics presented in a purely textual fashion.

Since there are rigorous measurements available only from the CAD System, there is a necessary conclusion that resourcing can only be done within the complement of Patrol personnel. There is no opportunity to quantitatively evaluate the relative contribution of Major Crimes, Fraud, Drugs personnel (for example) versus the staff of a Patrol Unit. Unless and until a person hour reporting system is implemented and effectiveness/workload measurement strategies are devised, the only resourcing that will be possible will be within the Patrol Units exclusively. However, the quantification of performance for the Patrol Units is already being provided by the CAD System's textual reporting system. Therefore, it is not considered that a significant incremental benefit would accrue to the Ottawa Police through the focus of the efforts of this project on replicating the already-existent Patrol Unit performance analysis.

While other data sources are also missing (as per the above chart), it is felt that these shortcomings could be overcome. However, even if the other

missing data was provided, supplanted or substituted, without the person hour data (or equivalent data, such as the adoption of "normative standards") the Resourcing Component would still fall far short of its long term objectives and be of questionable operational benefit.

- *Recommendation:*
  In view of the lack of data sources required to support the Resourcing Component, it is recommended that the implementation of this Component, as per the stated objectives, be deferred until such time as the missing data sources (primarily the person hour data) are addressed or an alternate strategy for calculating the relationship between person hours/entities of work is accepted. Further, before meaningful comparative analyses of the contributions of disparate units within the Ottawa Police can be carried out, Force-wide metrics of the value of work performed in all units must be designed and adopted. Without this consistent measurement, it will not be possible to redeploy Members across organizational boundaries to maximize the benefit to the Force as a whole.

3.3.2 Crime Analysis (CAD or RMS)

With the exception of the street level mapping database, the missing data sources to address the Crime Analysis Component for CAD and/or RMS are relatively minor. The value of analyzing and presenting CAD related incident activities which are based on the Ten-Code classifications, in isolation of the Records Management activities which utilize the Crime Classification Coding Structure, is questionable. Conversely, the analysis and presentation of Records Management Occurrence based activities in isolation of the CAD Incidents is also questionable. While it is true that the capturing of Incidents in the CAD environment accounts for very close to 100% of the number of combined Incident and Occurrence based activities, the amount of detail information captured in CAD on those Incidents which later become Occurrences, is quite limited. This limitation restricts the Crime Analysis capabilities to the "what" and "where" without any consideration for the option of delving deeper into the activity of interest and presenting additional informative information (i.e. event, person, vehicle, etc., details) about the activity. While it is felt that the street level mapping data could be made available, the value of the crime analysis component in either a standalone CAD or Records Management environment would very quickly become suspect and could result in a disillusioned user community.

• *Recommendation:*
  In view of the questionable value of applying the crime analysis
  component for analysis of either the standalone CAD or Records
  Management data sources, proceeding with the development of the
  Crime Analysis Component, for this limited purpose, is not
  recommended.

3.3.3 *Crime Analysis - Integrated CAD & RMS*

The Strategic Information Management System chart clearly indicates that
the vast majority of data sources, the organization of these data sources in
an integrated environment and the complementing organizational
infrastructure required to support an ideal Integrated Crime Analysis
strategy are not available. Therefore, the normal assumption which must
be made is that unless a strategy is adopted to create and implement an
integrated data source environment within the time frame and financial
constraints of the project, there is little value in considering this option any
further. While it is true that the ideal solution is probably not obtainable
within the constraints, there is one other strategy that could, in effect,
substitute data aggregation and correlation for proper data integration
between the RMS and CAD Systems. In effect, the strategy is to gain the
integrated database after the fact, through the matching of records stored in
the segregated RMS and CAD database.

This option involves utilizing a system generated "key" inside CAD which
identifies those incidents that are also to be classified as occurrences. In
other words, incidents from CAD that require the opening of a Records
Management based hard copy file can be isolated through the use of this
"key". This approach will eliminate the validity concerns caused through
the duplication of record identifiers in the CAD and RM Systems and
permit the analysis of all incident and occurrence based activities rather
than just the CAD or RMS activities.

One other factor that has to fall into place if this strategy is to be adopted,
is the marrying of the CAD Ten-Code classification system and the RMS
Crime Classification Codes. As previously stated there is not a direct one
to one correlation between these two classification systems. There does
however appear to be sufficient synergy between the two systems to permit
the aggregation of similar activities. This association will be required to
accommodate the reporting of those incidents generated in the CAD
environment that do not result in the creation of a hard copy file under the

RMS crime classification system. To achieve this, the two classification systems will have to be carefully reviewed. A separate common event classification coding structure, using the RMS crime classifications as its primary base, will have to be created. Once this has been achieved, the Crime Analysis Component will use this common classification system as the data source for the reporting and analysis of activities within Ottawa Police. Discussions are currently underway to implement this strategy and preliminary indications are that the creation of a common classification coding structure is achievable.

- *Recommendation:*
  Every effort should be made to establish a direct relationship between the Incident and Occurrence coding structures for the purposes of providing a common classification base upon which to analyze CAD and RMS activities.

With this strategy in mind, the only remaining question is the meaningful presentation of the data. It is our opinion that the optimal strategy is to present the data at the street level within the organization boundaries of the Ottawa Police. This approach will provide management and supervisory personnel at all levels throughout the department with an enhanced visual geographic appreciation of the "what, where and how many" aspects and would considerably add to the value and meaningfulness of the Crime Analysis Component. To achieve this objective requires the acquisition of a viable street level mapping product. Before a decision is reached on this issue, other questions such as the quality of available street level mapping data, maintenance of the mapping data base and product costing estimates must be addressed. Preliminary indications are that this goal is achievable and it is important that a decision to proceed be made in the early stages of Phase 2 of the Project.

- *Recommendation:*
  Every effort should be made to determine the viability of utilizing a street level mapping facility for the presentation and evaluation of activity data in support of the Crime Analysis Component.

3.3.4 Program Evaluation

A preliminary review of the criteria available to support the evaluation of Programs either in place or under consideration for implementation within the Ottawa Police is quite limited. This limited criteria results not from any lack of appreciation by the Ottawa Police but primarily from the

relatively short history relating to the availability of meaningful qualifiers. The other factor which is missing is the reporting procedures to support an evaluation of this nature. Not withstanding the recommendations concerning the integrated Crime Analysis Component, the probability of presenting the Ottawa Police with a high profile and productive Program evaluating tool within the framework of the project objectives is questionable.

- *Recommendation:*
  In view of the limited knowledge base concerning qualified evaluation criteria relating to the issue of Program Evaluation and the outstanding question relating to reporting procedures, it is recommended that any attempt to establish Program Evaluation criteria within the framework of this project be deferred.