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Computer Aided Dispatch Prototype System

Comnetix Computer Systems

TECHNICAL REPORT

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COMNETIX
COMPUTER SYSTEMS

COMPUTER AIDED DISPATCH

PROTOTYPE SYSTEM

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1.0 CONSTABLE™ COMPUTER AIDED DISPATCH PROTOTYPE SYSTEM

1.1 Introduction

The acronym **CONSTABLE**™ stands for **"Computerized On-Line System To Assist Better Law Enforcement"**. Comnetix Computer Systems' proposal for the development of a Computer Aided Dispatch (CAD) System Prototype identifies the methods by which we address the required functionality for a system of this nature. Also, our proposal takes into consideration an Enhanced 911 interface, a Records Management feed, the integration of Street Level Mapping, graphic analysis of CAD data, Executive Information Systems strategies and the CPIC impact within the Policing environment. While the proposed CAD System could function as a stand alone system with an interface to other automated information components of a Police Force, careful analysis has been performed for the purposes of defining and proposing an integrated conceptual architecture under which the CAD System should operate.

In support of a fully functional CAD System, the Canadian Police Research Centre (CPRC) and Comnetix Computer Systems Inc. propose to build a single workstation based prototype of a Police oriented CAD System which addresses and portrays the main components and operational features of a CAD System. This prototype system will provide the user with the opportunity to view and walk through the system features from a user interface point of view. The prototype system will also provide the user with a clear visual appreciation of the system functionality.

This document strives to describe the approach taken by Comnetix Computer Systems to the preparation of a conceptual data model for the corporate data requirements of the Police Department (Reference Appendix "B"). We then clearly illustrate how the proposed conceptual data model can be used to implement CAD functionality in support of a fully integrated Police Information Management System.

The Mapping system is to be used as both a tactical and a strategic tool for the Department. This document describes the tactical utility of mapping within the context of an emergency response and calls for service. It also describes the strategic utility of mapping as a way of summarizing densities of occurrence of certain types of events, etc within user defined geographic areas of the department.

1.2 The Technology

The descriptions of functionality within the CONSTABLE™ (CAD) System and proposed technologies are predicated on the use of the Constable™ Data Model, relational database architectures and client/server strategies.

This proposal is based upon a radical new approach to CAD Systems, eliminating any need for a dedicated CAD central processing facility. Therefore, not only will the software cost be low to subscribing agencies, but the hardware cost will be exceptionally low, due to the exclusive use of cheaper desktop computing.

The availability of computing resources local to the user provides a wealth of functional possibilities that are exploited within our proposed system. A key to the high performance expected through this strategy lies in the fact that the processing of a transaction at one user's workstation will not impact other users in the system.

The Comnetix strategy is to divide the execution load for the system across the available processing resources within the network. It is our intent to dedicate the intelligent CAD workstations to performing user interface and application processing. This strategy allows the agency's central processors to be dedicated to the satisfaction of database requests and relevant batch processing. In this way, the task of processing the transactions requested by a user only impacts that user's workstation, not the workstations of any other user. This strategy would also be followed in the event that there is a requirement to provide local databases in support of specific, segregated user-oriented functionality.

The proposed configuration of the central processing facility, telecommunication network and the intelligent workstations will provide a Police Force with significant fault tolerance as well. The architecture ensures maximum availability of the CAD System, since a failure at any one workstation will have no impact on the system access for users on other workstations. Concurrently, efforts can be directed at designing fault tolerance into the central processing facility through the design of redundant processing capabilities. Such host computer manufacturers as Tandem, Digital, Sun and IBM have strategies in place today for provision of this type of assured system availability.

As well, networking implementations, as guided through international standards bodies such as International Standards Organization (ISO), are gaining measures of fault tolerance. This is not only at the level of data recovery on the network, but also at the level of physical failures in communication lines. In addition, the design of the network topology can be focused on enhanced levels of fault tolerance through ensuring that no significant portion of the network is connected to the central facility by only one communications conduit. These are all issues which can be more properly and fully engineered after the system design process has been completed.

Our proposed design of an integrated Management Information System, which includes the CAD Component, is based on industry standard Graphical User Interface Protocols. These protocols were established to ensure a high degree of consistency in the functional aspects of any end-user application. The adherence to these standards provides consistency in the modus operandi of each and every application operating on the desktop workstation . The quantifiable benefit to the Police Service is that once an end-user has learned one application using the standard interface, the second, third and fourth applications can be mastered in a fraction of the time for conventional systems. The development of the CAD Prototype System will be based on these protocols.

The Comnetix solution is premised on the use of advanced technology tools for the development and implementation of the CAD System. In the preparation of this document, we have made every effort to ensure that the design of the system, with the integration of all of the proposed technologies, is not restricted from moving forward as technology evolves. We are confident that the technology used in our design infrastructure, which currently supports advanced graphical based imaging, the use of video technology, the retention and dissemination of sound recordings and voice exchange, will easily facilitate the infiltration of Artificial Intelligence technologies as these technologies migrate to Policing Services.

Our System Design and Development team uses the most advanced system development techniques and software tools available. These tools include Relational Database Modelling techniques, Computer Aided Software Engineering (CASE) Tools, Prototype Methodologies and Object Oriented Programming.

Our solution for the development of the CONSTABLE™ CAD System, which will be demonstrated in the CAD Prototype, uses an entirely data driven approach. This approach permits Police Service technical staff to maintain and enhance system functionality easily and often with little or no change in application programs. Our proposal is also compliant with the Police Information Technology Centre (PITC) standards.

Our proposed CONSTABLE™ data model, which includes the CAD requirements (Appendix B), does not merely map out an ad hoc solution. Special care has been taken to characterize the relationships between entities. These characterizations have permitted us to generalize and formalize the relationships among entities using tightly-defined application principles. Our proposal is therefore predicated upon a highly structured approach to the organization of the large number of required entities throughout all the CONSTABLE™ components (e.g. Records, Mapping, CAD, Image Management, Forms Management, Property Management, Case Management, Shift Scheduling, etc.). This structured orientation and the rigor of the data model architecture yields many dividends in terms of integrity of information and conceptual simplicity. The simplicity, in turn, results in a smooth and more rapid system implementation.

Another major benefit of defining not only the solutions to Policing requirements, but also setting the framework in place to support those solutions, is the opportunity to cleanly enhance and evolve the system over time. Adherence to the data model principles is all that is required to permit component integrated, cost effective growth in the future. Experience has shown that these enhancements can to a great extent be accommodated through the migration or slight modification of existing programs.

We suggest that the selection of our solution and the implementation of the CAD Component within the framework of the CONSTABLE™ Data Model will:
- provide the latest in Police analytical techniques;
- increase the Police Service occurrence clearance rate;
- provide an efficient feed for resource allocation capabilities;
- improve the quality of working life for each uniformed member of the Department;
- improve Officer safety through improved timely access to information;
- situate the technical resources of the Police Department at the forefront of technology.

2.0 COMPUTER AIDED DISPATCH

As previously stated the Comnetix approach to the implementation of the CONSTABLE™ CAD Prototype and subsequent Computer Aided Dispatch System includes the exclusive use of Intelligent Workstations. The mouse-driven, window based technology with computing resources local to the user, provides the user with a considerably enhanced level of performance and functionality in carrying out CAD oriented transactions.

The proposed architecture of CAD is based on the principle that all of the CAD transactions function as an integral part of the CONSTABLE™ Information Management System. Within a Corporate data base approach under a common architectural umbrella, all transactions are fully integrated with the RECORDS MANAGEMENT and MAPPING System components of CONSTABLE™. As previously stated, the CAD System may also function as an independent component with access to other data bases through interfaces.

2.1 Complaint Taking/Call Handling

The Complaint Taking Function represents the first line of service to the public and is responsible for capturing all primary information about an event/call for service to permit subsequent action (e.g. assignment of resources) to occur in the most efficient and effective manner possible.

In support of these requirements, the automated Complaint Taking Component must have access to the following basic functional capabilities and features:

- Facility to capture and manipulate event/call for service record information with sufficient details to support appropriate resourcing of the call by the Dispatcher;
- Facility to record Scratch Pad Notes (Text) and related event/call for service or caller information;
- Facility for duplicate and repeat call checking;
- Facility to automatically validate and perform address and location checking;
- Facility to provide alternative location (address) assistance;
- Facility to automatically identify that the incoming call is related to a Hazardous Address;

- Facility to provide details on specific event history (premise information) either at or within a given radius of the event location;
- Facility to automatically assign a predetermined priority to an incoming event. An example of the criteria which may be considered is the type of Event and circumstances (e.g. dangerous flag set, etc) surrounding the event;
- Management and transfer capability of information from a Complaint Taker's workstation to a system (generated) identified or operator selected Dispatch workstation for subsequent action;
- Capture and transfer of additional or subsequent data (updates) for the same event to the same workstation which had previously received the original transaction;
- Facility to identify and initiate Attention/Action that an event is for the attention of a particular unit within the organization or a specific subsequent action is required (e.g. Department Policy requires certain information is to be subject of a broadcast or that Department Policy/Procedures requires certain units within the organization to be made aware that a particular event occurred).
- Facility to access and display information contained within the Information Support Files.
- Facility to access full query and retrieval functions within the central Records Management System.
- Facility to access full maintenance functions within the central Records Management System.
- Facility to access, retrieve and display all Mapping System functions;
- Ability to directly feed the central Records Management System in real time either within an integrated environment or through an interface;
- Ability to maintain Local Information Files.

2.1.1 Complaint Taking Functions

2.1.1.1 Call Entry

Call Entry is defined as the ability to record a call (call for service, an event, or information call) either from a Complaint Takers workstation or a combined Complaint Taker/Dispatch workstation. It should be noted that the Complaint Taking functions are capable of being executed by authorized persons outside the Communications Centre environment (front desk area, records area, etc. - basically at any location within the

Organization that a workstation has been installed and loaded with the Complaint Taking software, using the appropriate user access privileges).

- The only difference between the two workstations relates to the physical transfer of data from a Complaint Takers workstation to a Dispatchers Workstation, the logistics and controls in support of that transfer and the designation of operator responsibilities. The functionality normally associated with a Complaint Takers workstation, a Dispatchers workstation and a combined Complaint Taker/Dispatch workstation are determined at operator sign on time and in essence are transparent.

If a complaint taker decides to process a call for service s/he will:

- record the call information, perform address validation (which can be cancelled/bypassed if desired), make whatever queries/checks are necessary and forward this information to a dispatcher for further action if a dispatch is required. The call is added to the CONSTABLE™ data base and any further action is the responsibility of the dispatcher, other than the recording/forwarding of supplementary information, etc;

- record the call information, perform address validation (which can be cancelled/bypassed if desired), make whatever queries/checks are necessary, and add the call to the CONSTABLE™ data base with no dispatch required. The call is either concluded or identified for the attention of a designated user or designated user groups (for the information of Drugs, Fraud, etc. units) for information, review or further action (this process is a question of policy relating to the information management processes within the Department);

- record sufficient call information (mandatory data to commit the entry of a call to the CONSTABLE™ data base plus the necessary supporting information) to permit the Department to contact the Complainant at a later date/time. The capability of invoking a "status time clock" facility to remind the complaint taker/dispatcher that some action is to be taken (i.e. the Complainant is to be called back) is provided through the *time clock* facility.

During the address verification process, if no match is found, the system must present the following:

- street names or common place names which are potential matches for the location entered;
- all intersections which are potential matches for the two streets entered;
- streets of the same name where a suffix or direction has not been entered by the user to differentiate between them; and
- streets which have the same name and suffix.

If the call is being processed by a combined complaint taker/dispatcher, the same functionality applies.

2.1.1.2 Partial Call Entry

Partial Call Entry refers to the capturing of a minimum amount of information before the call can be accepted by the system.

Mandatory information is required before a record may be added to the proposed CAD System. In general terms the only true mandatory field is the system generated Incident ID (Call Number). In this situation the system would default the Incident Type to "Unknown", generate the Reported Date/Time and check to see if there has been an entry made in the Supplementary Text (free formatted text) area. Since there is nothing which prohibits a Complaint Taker from recording the type of call and the call location in free text format it is questionable if the location field should be mandatory. Logic dictates there is little value in forwarding a call for service for dispatch if the type of call or the location of the call is not known (i.e. recorded). The entry of a valid call type code and location can become mandatory fields if so desired by the Department. Once the mandatory information is captured the event (call) may be transmitted for dispatch. As previously stated, supplementary information may be added to the event or call for service as it becomes available.

2.1.1.3 Call Acceptance/Rejection (Edit Rules)

This proposal suggests that the decision for system acceptance of a Complaint Taker initiated acceptance and request to forward or the system rejection of an acceptance and potential subsequent request to forward a call for dispatch, be based on the definition of *Critical* and Non *Critical* errors. The definition of critical errors should be kept to a

minimum. The identified critical error would have to be corrected prior to forwarding a call for dispatch. Non-critical errors could be highlighted with the operator having override capabilities. An example of a critical error could be a call for service which requires a dispatch to the location of the Event and the location has not been recorded. These "critical and non critical error definitions" would be determined during the final system design phase.

The refusal by the system to accept a concluded transaction until all errors, as per the system edit rules, have been corrected is critical to the integrity of the CONSTABLE™ data base and is provided through our Front End (FREND) editing facility.

Individual and interdependent field validation (including appropriate warning indicators/messages, etc) is a standard facility within our proposal for the CONSTABLE™ CAD System.

2.1.1.4 Supplementary Text Facility

In an effort to provide a complaint taker or any designated user with the facility to quickly record text type information to meet emergency situations which cannot be handled in an efficient manner through the normal information recording processes, Comnetix proposes to include a Supplementary Text facility. This facility also provides the user with the capability of recording information which is not intended to be classified as an event record (call for service, etc.) but is of special interest at a particular point in time. This information could be classified as a Text Structure if the event was known or could be recorded as supplementary text information if not related to an event. The supplementary text could have a pre-specified life cycle of 72/96 hours, etc. after which time normal maintenance functions would clear it from the system.

2.1.1.5 Call Classification (Incident Types)

Call Classification refers to the identification of the type of call received in a formal and structured manner.

Our proposal provides for the classification for all types of calls for service regardless whether they require a dispatch or not. If there is an additional requirement for further classification, or to attach a particular "status" or group calls as to the way they were handled, then this facility

can be provided (e.g. Advise Call, Information Only Call, Administrative Call, etc). This function would be achieved through the entry of the appropriate categories/codes within the Global Codes. It is our opinion that the event coding structure covers this issue and that there is no reason for a further breakdown.

2.1.1.6 Call Numbering

Call Numbering refers to the identification of a call by assigning a unique number to the call.

Constable™ provides for system generated unique sequential numbers by year for all Root level entities - supporting Calls for Service and "Previous Call Number" (Section 2.1.1.15 below). The initiation of a Call, Project, Case, Event, etc for entry on the System results in a system generated sequential number for that entry. It is our belief that the design of the components of CONSTABLE™ within an integrated common corporate data base approach precludes the necessity to provide for unique numbering systems within each component of CONSTABLE™ for the same entity.

2.1.1.7 Call Acceptance and Forwarding

Call Acceptance and Forwarding relates to the acceptance of a call by the system and the transferal of that call to a user initiated or system controlled dispatchers workstation.

The call will be stored in the central CONSTABLE™ integrated database, and forwarded immediately to the appropriate dispatch workstation as per set up procedures. The other available option is to have the call transfered to workstations on a rotating (sequencing) basis. This option takes into consideration the existing load currently being handled by the target workstation (type of call - priority, backlog of work, etc).

2.1.1.8 Call Transfer

Call Transfer is defined as the ability to transfer complete or partial information recorded in relation to a call from one workstation to another workstation.

The system supports the transmission of a complete or partially-completed panel of information to another workstation. The transfer will require that the sending workstation identify the target receiving workstation and that the receiving workstation be currently signed on to CONSTABLE™. The entry of the call through the current panel will be aborted at the sending workstation, and the information will appear in a separate panel in the receiving workstation, with all the call information from the sending workstation intact. Other than forwarding supplementary information, the sending workstation will no longer be involved in any way with the call after the transfer (this design decision is based on the assumption that the environment being supported is a separate complaint taking and dispatch operation).

2.1.1.9 Call Transfer Acknowledgment

The Call Transfer Acknowledgment refers to the systems capability to advise the sender of a transaction that the transaction has been received and by whom.

To address this requirement this proposal endorses the strategy of initiating a system generated Alert which would identify the record in question (Event Number, Attachment Number, etc) and the fact that the call transfer transaction was accepted. The other option which is available is to generate the Alert message if the call is NOT received.

2.1.1.10 Emergency Call Display

The Emergency Call display refers to the system automatically displaying certain calls on a number of designated workstations.

The simultaneous display of an emergency call at all or designated workstations is addressed by the user during the set up procedures. The user would identify each workstation slated to receive a display of the

emergency call and also identify the type(s) of emergencies that will trigger the multiple display (e.g. Priority 1 - life threatening).

The dispatcher to which the call is be forwarded is determined by the geographic area of responsibility for dispatchers, which is resident at the workstation level. The definition of each dispatcher's area of jurisdiction is achieved through the define jurisdiction function within the Mapping System. The coordinates of the location of the call for service are recognized as being within a defined Dispatch Jurisdiction Geographic Area and the system transfers the call to the terminal which contains the Dispatch/Terminal ID which corresponds to the Dispatch Jurisdiction Area in question.

2.1.1.11 Supplementary Information

Supplementary Information refers to the recording and transfer of additional information relating to an Occurrence.

The indication that supplementary information is to follow or that information is supplementary to original data is achieved through a supplementary flag. The supplementary information is identified through highlighting. Should the supplementary information be recorded in the form of a text structure, the text including the system generated appropriate root level identifiers and date/time information, is recorded within the Text Structure.

2.1.1.12 Call Stacking

Call Stacking is defined as the ability of the system to temporarily set aside an entity of work, to retain and keep track of this work in an orderly fashion and to present these activities to the user for continuation of processing.

The stacking of calls takes place at the workstation level. The user has the option, through the requesting of the appropriate screen via the menu bar, of recording information on a screen in relation to a call, interrupting that process - requesting a new screen, interrupting that process and requesting another screen, etc. The interrupted screens are stacked one on top of the other in a layered format for ease of recall. All information is retained for each screen.

A click of the mouse on any portion of a layered screen immediately brings that screen to the surface for viewing or continuation of the data entry process. Virtually any number of screens may be layered up to the system limit. It is proposed that the layering of between 5 to 8 screens would be considered reasonable. The system also provides the user with a window viewing option (menu bar item) which provides a view of the the stacked screens. The screens appear in sequential order with the screen currently being worked on highlighted. The user may select any of the screens in the list, and once the selection has been made the system immediately brings the selected screen to the surface.

The user may preset a timer (time out) condition for stacked screens. The setting of the timer is user initiated for an activity or preset for specific activities. The timer may be changed by the user at his/her discretion. The system will generate an alert message should any activity which has been placed on hold exceed the time out condition.

2.1.1.13 Repeat Call Checking

Repeat Call Checking refers to checks made by the system on new Calls to determine if the new call is potentially a person calling back in regard to a previous call by the same party. In this case a new incident is not to be created but the supplementary information should be noted.

The Repeat Call checking features within the CAD Component are based on a comparison of known information for open/closed calls as follows:

- The location (includes location match and a user defined location radius) of the Event;
- The originating Enhanced 911 details of the call;
- The type of Call (Event) - Event Group Code and/or the specific Event Code within the Group Code); and
- The reported date/time range (preset by the user).

The display of repeat calls will be provided through a list box approach with a scrolling window feature. Upon the selection of an entry in the list box, the system displays a synopsis of the details of the repeat call record for user viewing. In the event the user decides the selected record is a repeat of a previous call, the user has the option of deleting the repeat call or creating a relationship between the two records with the reason for relationship being "Repeat Call". The user has the option of repeating

this selection and relationship creation process until in his/her view there are no more records that meet the criteria of qualifying as a "repeat call".

Upon transfer of the current call to the dispatcher the system automatically creates a synopsis of the "repeat calls" and provides them for display (as records related to the current call) at the dispatchers workstation (header area, list box details, synopsis of the record). The dispatcher has the option of viewing the complete details of all the related calls through the Menu Bar retrieve function.

2.1.1.14 Possible Duplicate Calls

Duplicate Call Checking refers to checks made by the system on Calls to determine if a new call is potentially a duplicate report by a new party reporting an incident already recorded.

The Duplicate Call checking features within the CAD component of the proposed CONSTABLE™ System are based on a comparison of known information for open calls as follows:

- The location (includes location match and a user defined location radius) of the Event;
- The originating Enhanced 911 details of the call;
- The type of Call (Event) - Event Group Code and/or the specific Event Code within the Group Code); and
- The reported date/time range.

In the event the system decides that the call may be a duplicate of an existing call, the details of the original call will be retrieved and displayed. At this point, the name and address of the new party could be recorded and attached to the incident and any supplementary information recorded as a new supplementary text record.

The display of possible duplicate calls not initially caught by the user will be provided through a list box approach with a scrolling window feature. Upon the selection of an entry in the list box, the system displays the details of the duplicate call record for user viewing. In the event the call data is truly a duplicate of a previous call, the user has the option of deleting the duplicate call or if there is supplementary information to the original call, adding that information to the original call. Adding supplementary information to an original call is achieved by identifying

the supplementary information and initiating the copy feature. The user must indicate to the system (Menu Bar item) if the copy feature is a modification for the existing data or a supplementary text transaction. If it is to be a supplementary text transaction, the user creates a text structure and adds the structure to the Root entity in question.

If the user wishes to retain the person information relating to the duplicate call, the person would be added to the Person Attachment entity within the original Root (Event) record. The person making the duplicate call would probably be added as Person Number 2 with an involvement of Reporter, Complainant, Witness, etc.

The modified or supplemented record would be transmitted to the appropriate dispatcher and highlighted for his/her attention.

2.1.1.15 Previous Call Number Recording

The proposed CAD component of the CONSTABLE™ System accommodates all of the common call entry data requirements associated with a CAD System, however, with an integrated architecture, the requirement to record a *Previous Call Number* as noted in most CAD Systems on the market today, is not needed.

The integrated CONSTABLE™ architecture promotes the concept for the assignment of a single sequential numbering system for all Root level entities. The centralized integrated data base approach precludes the necessity to create cross referencing numbers to link information captured through different components of CONSTABLE™ which pertain to the same entity. Based on the assumption that this concept is acceptable to the Police Force, there doesn't appear to be any value in recording a Previous Call Number for the purpose of functioning as a key to access Call data stored within a Corporate Data Base.

The question of utilizing a single numbering system for all activities (Root level) within the Police Service or to initiate a single numbering system for each type of Root level entity is dependent to a large degree upon the File Storage (Central, Segregated, Decentralized, etc), File Management and File Control (Master/Work File) policy and procedures in place within the Police Service. This issue should be addressed during the detail design phase.

2.1.1.16 Cross Reference Number to a Call-back

Our approach to meeting the intent of recording a *Cross Reference Number* (for reference purposes in the retrieval of a Call), in part, uses the same logic (the original call and the call-back refer to the same Root entity on the data base) as proposed for meeting the purpose of recording the above Previous Call Number. In addition, the setting of the *time clock* with a status of "call-back" references the unique identifying number of the Call (or any entity) that the *time clock* is set against. The selection of the *time clock* by the user (e.g. double click with the mouse) results in the display of a Header Area which contains highlighted strategic Call and Time Clock data. CAD automatically retains or transfers the unique entity (Event) number (contained in the Header Area) to the Retrieve Function within CONSTABLE™. A single action by the user through the Menu Bar results in the retrieval of the Call record in question. This simple process provides the user with the necessary information to return the complainants call and to record additional information if required.

2.1.1.17 Call Summary Viewing

Call Summary Viewing refers to the ability to view a synopsis of completed or outstanding calls.

The system provides authorized users with access to completed or outstanding Call summary data for all events on the data base. The outstanding call data is available for permanent display at the appropriate Complaint Taker and/or Dispatch Workstation or may be called up (Menu Bar item) as required by the operator. With the proposed windowing technology and with the time clock feature in place to warn a user that some action is required on a call, our preference is to address this requirement through the user initiated Menu Bar approach rather than a permanent display.

2.1.1.18 Priority of Calls Entered for Dispatch

The establishment and assignment of Call Priority is based solely on the Departments interpretation of the factors involved which lead to a decision as to what resources should be assigned and the urgency of this assignment in terms of response.

Dispatch priority codes may be entered by any authorized operator. Defaulting priority of response (e.g. Default to routine or default to "X" "Y" priority for certain alarm types) is available, however, a definition as to the criteria for default must be clearly established. Call details that are determined at the time the call is being taken which may have an impact on the priority of the response, such as in progress, life threatening, etc, are important considerations. Emergencies relating to Members (MDT or Voice Code) can be defaulted to the appropriate priority response as per the policy of the Police Department. It is our intent that the system display emergency calls, with an appropriately highlighted Emergency Alert message, at all designated workstations.

The following is an example of potential Call Priority Codes:

Code	Description
1	Event In Progress Human life is being, may be threatened.
2	Event In Progress Police are required to respond immediately but the Event is not considered to be life threatening.
3	Routine Response Officer required at scene.
4	Routine/No Response Necessary Officer not required at scene. May or may not require a written report.
5	Administrative related events.

2.1.1.19 Cancel Call for Dispatch

The cancel call for dispatch facility is available through either the operator entering the call identifiers for the call in question or through the retrieve function. Once a call has been retrieved the dispatch requirement may be cancelled through the selection of the cancel dispatch function. The system issues an alert message to either confirm the cancel (e.g. Dispatch For Occurrence 99 999999 Cancelled) or to advise the complaint taker that the call has been dispatched and cannot be cancelled.

If the call has been dispatched the alert (e.g. Occurrence 99 999999 Dispatched - Invalid Cancel Request) appears at the dispatchers workstation as an information alert. If the call is being cancelled by a dispatcher, the system generates the confirmation alert (e.g. Confirm Cancel), and the call is removed from the dispatch queue. The dispatcher may abort a dispatch action at any point in the process. The system records the dispatch date/time, etc data available and the fact that the dispatch action was cancelled.

Modifications may be made to any call (event record) by any person with the proper access authority. The initiation of a modify transaction results in the record being locked by the system (not accessible for maintenance by any other user) until the modify transaction has been completed. In the event a call is available to be modified (not locked by any other user) the fields in question are modified and the record is displayed at the appropriate dispatchers workstation.

2.1.1.20 Call Retrieve and Modification

The system provides for the Retrieval and subsequent modification of all entities at any level within the CONSTABLE™ System (Menu item in the Menu Bar). This functionality is provided to all authorized users. The retrieval of a Root level record is based on the entry of the Root Identifier Number or through the selection of a "unit" assigned to the call. The retrieval of an Attachment entity is based on the identification of the Root Identifier Number for that Attachment, the entry of the Attachment Type and Attachment Number. Retrieval of records is also available from query output responses. The system remembers the Event Number and if applicable the Attachment Type and Number of a selected record and retrieves the selected record (Event level or Attachment level) in question. This retrieval function is activated through the selection of a Menu item in the Menu Bar. The Query by Location (date/time range) with a subsequent retrieve through the Menu Bar is also available.

2.1.1.21 Concluded Events (Records)

A Concluded Event (Occurrence, Call for Service, etc) refers to a decision by an authorized person that all the work relating to an Occurrence has been completed, there are no outstanding issues (diary dates, etc) and there is no justification for the record to remain open (active). Once this decision has been made, a Conclude Event transaction

is initiated on the system and the retention (based on the Departments purge/archive strategies) time clock commences. Events may be concluded at any point in the system - by the Complaint Taker (either within or external to the CAD environment), by the Dispatcher, by Records Management Personnel, etc.

Our proposal calls for the concluding of files (Closed records - Projects, Events, Calls for Service, etc) at the Root level. Once a record is concluded all Attachments, Subattachments and Structures connected to the Root level Record are also concluded. Edit rules are in place to ensure that the Conclude does not take place if any of the entities attached to a Root level record are active (e.g. an open diary date). Concluded (Closed) Calls may be reopened by any authorized user. If a user tries to add or modify information to a Concluded Record, the system generates an alert message which requests confirmation that the record is to be reopened - the action which resulted in the record being concluded will be modified to "open" status. Once a Call is reopened the operator has the option of adding a new attachment, subattachment record, modifying information (adding new information in a blank field, modifying existing information within a field or deleting information in an existing field) and deleting the record.

2.1.2 Location Alerts

The system provides for an automatic search capability and display relating to associated Location Alert data (hazardous address, previous call, etc, information.

2.1.3 E-911 Emergency Calls

The Enhanced 911 originator (subscriber's name), site (location the call is being made from) and telephone number (the telephone number which the call is being made from - subscriber's number or phone booth, etc) will be provided through the E-911 Interface and be displayed as part of the Call for Service information, on the complaint takers workstation. If the complaint taker determines that the information is valid, the system must allow the complaint taker to transfer the information to either the Incident fields or the Complainant fields.

Once the transfer has been made, the system must allow the Complaint Taker to type over any portions of the information that need to be corrected. The system must allow the user to ignore the information if s/he desires. If the information is not available, the system must indicate this to the complaint taker. The complaint taker will then enter the address and phone number in the appropriate fields.

2.1.4 Alarms

False alarms are handled in a way which is consistent with the conceptual data model and wholly consistent with the architectural principles of the proposed CONSTABLE™. The set of all alarmed premises is kept in the CONSTABLE™ database. Events are generated to maintain the fact that a premise is alarmed, including the name of the business or person where the alarm is installed, contact persons, telephone numbers, etc. Also included will be the code for the supporting alarm company as well as an alarm control number (ACN) which uniquely identifies this alarmed premise. The code for the alarm company will be validated against the family of global codes for alarm companies.

When an notification of an alarm is received, an event will be created by the system to describe the call (e.g. Call Type: ALARM). The event created will be given a call type code and a call priority to reflect the nature and response priority of the call to which Police Service Members are dispatched. If a second alarm is received from the same alarmed premise (time dependent), the system will generate an Alert message and if required, record the fact that a duplicate alarm was received and the alarm information, including date/time data, would be recorded as part of (in addition to) the original alarm notification. The Members attending at the scene will make the determination as to whether the alarm is valid or

a false alarm. This determination will result in the recording of the prime event type code as either "False Alarm", or the actual event type, etc. (The call type code for that event will remain "Alarm" to reflect the fact that Members were dispatched to the alarm.) The event will also retain the ACN of the premise issuing the alarm. Therefore, analysis of frequencies of false alarms for certain premises will be available through a count of events with "false alarm" event type codes and a specific ACN.

2.1.5 Supervisor Monitoring

The system provides the capability for a supervisor to selectively monitor all complaint/dispatch/status keeping activities of any workstation. As previously stated the supervisor may take over control of the activities of any workstation.

2.1.6 Transaction Printing

The current technologies utilized in most Computer Aided Dispatch systems available on the market today typically use non intelligent terminals with a central processor. The use of these non intelligent terminals dictate that printing be done regularly so that a worst case fallback position could be established in the event of total central processor failure. Our proposal differs in the important dimension that all user workstations will be fully intelligent. Therefore, there is no possible single point of system failure for the proposed architecture. In the event that the central processors all fail, each user still has full access to all the information residing at their particular workstation. Therefore, in the event of a total system failure, the users could revert to local use of the contents of their workstations *at the time of failure*. No ongoing printing is therefore required.

2.2 Dispatch/Status Keeping

A Dispatch/Status Keeping Component represents one of the most critical area of functionality within the CAD System. The Dispatcher must continually monitor and be aware of a host of activities, events, patrol unit status and availability of assignable resources.

The Dispatcher is fully responsible for all dispatching activities and the monitoring of all available and currently assigned resources to respond to calls for service. The Dispatcher is also responsible for providing logistical support to personnel and patrol units and to ensure minimum availability of patrol units for deployment is adhered to at all times.

In general terms, Dispatch refers to the assignment of a resource to meet a particular requirement or purpose. Status Keeping is defined as that function which permits an operator to maintain and display the recorded disposition of patrol units. The status keeping function is a two part process, the recording of a status and the look up or viewing of a status.

In support of the operational roles and responsibilities of the Dispatcher, s/he must have the following functional capabilities and features:

- Full functionality and capability as provided through the Complaint Taking component;
- Ability to add, modify and delete patrol units and members within the system;
- Ability to simultaneously retrieve, display and manipulate patrol unit status information;
- Ability to receive and record in real time, progress information such as indicators for on-route, at-scene, cleared-scene, out-of-vehicle, etc., for any or all events being monitored;
- Ability to perform Patrol Unit/Member status monitoring including date/time data, status time clock, etc.;
- Ability to create, manage, retrieve and display all events that are held as pending or unassigned;
- Ability to automatically monitor events based on time, classification and priority of event, etc.;
- Ability to immediately retrieve, display and identify all available/non available patrol units;

- Facility to have the application generate recommendations relating to which patrol unit(s) should be dispatched;
- Ability to display and track all Patrol Unit/Member assignments;
- Ability to reset the timer against a dispatched activity, unit or member;
- Ability to generate and receive data communication messages and transactions to and from Police Unit-Mobile Data Terminals;
- Ability to broadcast basic messages to all patrol units;
- Facility to allow the Dispatchers the capability of retrieving event and non event requests for dispatch in order of priority (priority of the call and by date, time sequence); and
- Facility to automatically generate statistical information based on the performance activities within the CAD/Status Keeping Environment.

2.2.1 Dispatch/Status Keeping Functions

2.2.1.1 Call Display

Call Display for a Dispatcher relates to the acceptance of a transfered call and the display of that call on a dispatchers workstation.

The call will be received at the dispatchers workstation and displayed in sequential descending order in the form of a scrolling list box entry. The priority of the call and date time considerations will dictate the system generated sequencing of these entries.

The call waiting list box displays (highlighted) the next call in line for dispatch. If there are no calls waiting the scroll bar will be inactive. If there are calls waiting the scroll bar will be active. The number of waiting calls which may be visible within the list box is to be determined during the detail design. The scroll bar area not visible to the user may be shaded/coloured, etc to indicate the existence of calls that are not visible. Audible warning are available and may be set at the users discretion.

Once the call is selected (opened) from the list box the information to be displayed is made available to the dispatcher. The Mapping information will be displayed through the Mapping System.

The display of the next occurrence to be acted upon by the dispatcher may be system generated, as per the prioritized sequence within the scrolling list box or operator selected. The operator could select any occurrence in the list box in any sequence. The highlighting or selection of the desired occurrence by the dispatcher results in that occurrence being displayed for viewing and subsequent action. The operator has the option of working on several occurrences at approximately the same time. The interrupted screens (windows) are stacked one on top of the other in a layered format for ease of recall. A click of the mouse on any portion of a layered screen immediately brings the selected screen to the surface for viewing or continuation of the data entry process. As previously stated, the only limitation as to the number of windows which may be layered is the system limit, but a realistic number is between 5 and 8. In the event that the time clock had been set (e.g. internal policy which stipulated that a call must be acted upon within a 15 min, 1/2 hr, 4 hr time frame, etc) and if no action had been taken within the pre-

specified time frame, a system generated alert would be issued as a reminder.

As previously stated, the dispatcher would have full Complaint Taking (Query, Retrieve, Maintenance - add, modify, delete, access privileges).

The holding of a call for dispatch at a later time or for a specific unit is also provided for.

2.2.1.2 Receipt of Supplementary Information

The receipt of Supplementary Information at a Dispatchers workstation will be identified by the system activating the Supplementary Information Flag. Selection of or clicking on the Supplementary Information Flag Icon results in the display of the occurrence with the supplementary information highlighted.

In the event that the supplementary information resulted in a change in the Priority of the Occurrence, the occurrence would be automatically sequenced in the Call Display scrolling list box accordingly. If the supplementary information resulted in a higher priority, the time clock would be reset to reflect the timing considerations of the higher priority. In the event the supplementary information resulted in a lower priority, the time would be carried over to the time clock setting of the lower priority.

2.2.1.3 Call Selection/Display

The call waiting list box displays (highlighted) the next call in line for dispatch. If there are no calls waiting the scroll bar will be inactive, and an indication of no calls waiting will be visible. If there are calls waiting the scroll bar will be active. The number of waiting calls which may be visible within the list box is to be determined during the detail design. The scroll bar area not visible to the user may be shaded/coloured, etc to indicate the existence of calls that are not visible. Audible warning are available and may be set at the users discretion.

Upon the selection of an occurrence from the scrolling list box for dispatch, a synopsis of the occurrence information will be displayed for the information of the dispatcher. The exact information to be displayed and its format will be determined during the detail design of the system.

2.2.1.4 Call Dispatch

The dispatching of a call refers to the assignment of resources at a level suitable to meet the resourcing requirements of the call in question. The number of resources to be assigned (i.e. greater than one unit) and the proposed distribution of these resources in support of the call (i.e. Bank Alarm or confirmed Bank Robbery) is a question of internal policy and can be supported within the recommended units and deployment design considerations of the CAD System.

The integration of the Mapping Component as per the Constable™ architecture with the CAD Component is critical to the successful implementation of these strategies, (e.g. the recording/confirmation of the Robbery Event, the location of the Robbery and the graphic display on a map of the location of the Robbery and the preset resource deployment sites surrounding the area in question).

2.2.1.5 Recommended Units

Recommended Units refers to the system suggesting or presenting to the dispatcher patrol units which are available to be assigned to a call which has been selected for dispatch.

Available units assigned to a lower priority call, available units from other areas and units at the scene of an existing call (assuming that most members carry portables) are also identified. The loading of Member/Unit and assignment area is achieved through the entry and maintenance of the Daily Duty Roster.

The priority of the call (a call of a higher priority than a previous call and a decision to redeploy a currently assigned patrol unit), the call type and call conditions (weapons involved or there is some form of danger to the member, etc) and the internal resource deployment strategies (structure of patrol zones, beats, roving patrols, etc) within the Department are all factors which must be considered within the recommended units feature. The implementation of this feature, its benefits and the level of functional complexity are issues which are to be addressed in the detail design phase.

2.2.1.6 Prime/Supporting Patrol Units

A Prime Unit refers to the Unit which has primary responsibility for the occurrence or task for which s/he was dispatched. A Supporting Unit refers to the dispatching of a Unit in support of or as a back up to the Prime Patrol Unit.

The recording of a prime unit and support units including the time clock facility is provided. The time clock may be activated/deactivated through the unit status entry (on route, at scene, cleared scene, etc). It is proposed that the system default the first unit dispatched as the Prime Unit and subsequent Units as Support Unit 1, Support Unit 2, etc. The dispatcher has the option of designating any unit dispatched as the Prime Unit.

2.2.1.7 Status Remarks

Status Remarks refer to the ability to record free text comments in relation to a Patrol Unit Time Stamp entry (e.g. 10-6 Servicing PC - Joe's Garage 15 min). The size of the comments field (i.e. fixed field size or scrolling window) will be determined during the detail design phase.

2.2.1.8 Unit Assignment - Police

Police Resource Assignment refers to the assignment of Police related resources (Patrol Units, Members, Special Units, etc) in response to a request for service.

If the Recommended Units feature is used then upon selection of the occurrence for display, the system presents the recommended units in descending workload order. This approach attempts to ensure, within limits, a balanced assignment of workload across all units. The dispatcher would then select (mouse driven - point and click approach) the desired unit(s) for dispatch or select "OK" and the recommended unit(s) would be recorded.

If the Recommended Units feature is not implemented, the preferred approach would be to have the available/assigned units accessible for selection through a permanent display. The available, assigned, priority of assignment and workload factor sequencing of units as discussed above would apply.

Upon selection of a unit or units for assignment or dispatch, the system automatically updates the Dispatch Attachment Record and defaults the applicable date/time stamps.

Occasionally, it will be necessary for a Dispatcher to add a unit to or delete a unit from the available unit list. As well s/he may need to change information associated with a unit on this list. The Dispatcher must also be able to transfer information from one Unit Identification to another.

2.2.1.9 Resource Assignment - Non Police

Non Police Resource Assignment refers to the assignment of Non Police related resources (Fire Department, Ambulance, Municipal Services, Hydro, etc) in support of a response to a request for Police services.

The selection of a non geographic based Resource type (e.g. Municipal Services) results in the display of the resources available, including contact information, within the resource type. Upon selection of the desired resource, the system initiates the contact (i.e. dials the telephone number) for the operator. If the desired resource is geographic based (e.g. Fire Department or Ambulance) the system initiates contact (dials the telephone number or whatever direct contact facility is in place) for the resource responsible for responding to the location in question (i.e. the occurrence location. This facility is available through the integration of the Mapping, CAD and RMS Components.

Upon selection and assignment of a non Police resource, the system automatically updates the Dispatch Attachment Record and defaults the applicable date/time stamps associated with the notification/assignment of the Non Police resource.

2.2.1.10 Date/Time Stamps

Date/Time stamping refers to system generated date/time entry defaults resulting from patrol unit status changes and incident status changes.

Our proposal supports a system generated Date/Time entry for every patrol unit status change regardless of the reason.(e.g. Assignment/Dispatch, On Route, At Scene, Cleared Scene, At Court, Vehicle Servicing, Coffee, Lunch, Busy, Back in Service, Vehicle and

Person checks, etc.). Incident related status date/time information is related via the Dispatch Attachment record as the status entry occurs, while non-incident related status date/time information may not create a time stamp record at all. The alignment of status codes relating to operational or administrative functions is retained in the Global Codes as noted in Section 1.2 Validation Tables. Administrative or non occurrence related statuses are retained in a separate file for analytical and historical purposes.

2.2.1.11 Estimated Time of Arrival

The proposed prototype system does not include the metrics required to permit the estimation of arrival times for dispatch calls. Most of the information suggested as criteria for these metrics is available through the standard databases maintained for the dispatchers. However, the inclusion of geographical size/travel time information will be difficult to achieve until AVL (automatic vehicle location) is installed. Our proposal is fully compliant with the requirements of such systems, and Comnetix has done extensive exploration into such technologies.

The notion of adjusting the metrics according to experience is a consideration, providing a closed feedback loop for the estimation algorithms. Standard factor analysis and regression techniques should be adopted to promote the refinement of the estimation techniques over time. This analysis should be done through a batch pass through the estimated (not the agreed delayed response calls) times versus the actual arrival times of the events within a certain recent period of time (i.e. the previous month).

2.2.1.12 Monitoring Units and Calls

Windows for displaying Vehicle (unit) status summary data are provided. The display could be continuous (the window is always open) or the display could be activated through a menu item. This decision is dependent upon a users requirement to constantly view or periodically view status data. The size, location and window display characteristics will be determined during the finalization of the detail design. The requirement to constantly view or periodically view the status of police vehicles or members is based upon the volume of traffic, peak load, etc. The preferred option should be towards a permanent view.

2.2.1.13 Unit Contact Timers

As previously mentioned, the time clock (including time defaults) may be pre-set or set by an authorized user against any time related activity within the system. Audible alarms are available if desired.

2.2.1.14 Alert Messages

Our proposal provides the ability to perform Multiple Concurrent Sessions. Alerts, warnings, notifications, etc, will be displayed without any interruption of the task currently being worked on.

Location Alert records will be retrievable through a standard Retrieve 1st, Retrieve Next, etc, feature. The call indicators will reflect that Location Alert data (including what the alert was) was displayed to the dispatcher.

All locations will be checked for location alert data. Hits will be displayed at the dispatchers workstation.

2.2.1.15 Command Transfer and Control

It is proposed that the system provide for the transfer of a call and the redeployment (reassignment) of units under the control of workstation(s) to other workstations either within or through a separately located facility external to the Communications Centre. (i.e. a separate facility or site designated for handling emergency measure situations, e.g tornado, earth quake, air disaster, industrial accident, special operations, etc).

A dispatcher may transfer control of a call for service or a special assistance request to any other workstation. The system provides the operator with a list (list box) of available workstations. The selection of the designated workstation and the initiation of the transfer results in the transfer of all information relating to the call or special request to the designated workstation.

An operator designated as a Supervisor may monitor and/or take control of an activity or activities from any other workstation.

2.2.2 Inquiries

All user query and retrieve capabilities within CONSTABLE™ are based on user access privileges. Generally speaking, query responses are displayed in a list box approach. The user has the option of selecting a response for a display of a synopsis of the record on file. If the user wishes to view the entire record, s/he activates the retrieve capabilities of the system through a menu bar item. The user may return to the list box and select other records for viewing as required. All query and retrieve capabilities may be utilized without having to create a root level entry.

2.2.3. Reports - Examples

2.2.3.1 Call Status Summary Report - Example

An authorized user may request a summary report by jurisdiction of the calls awaiting dispatch. This request would be in the form of a Get Call Summary (with qualifiers as to jurisdiction, etc). The system would take a snapshot of the call summary data at that time and format the report for display.

2.2.3.2 Unit Status Summary Report - Example

An authorized user may request a Unit Status summary report by jurisdiction. This request would be in the form of a Get Unit Status Summary (with qualifiers as to jurisdiction, etc). The system would take a snapshot of the call summary data at that time and format the report for display. The output criteria as requested by the Police Service will be provided.

2.2.3.3 Unit Roster Summary - Example

An authorized user may request a Unit Roster summary report by jurisdiction (with qualifiers as to jurisdiction, etc). The system would take a snapshot of the Roster data at that time and format the report for display. The output criteria as requested by the Police Service will be provided. The retention period for Roster Data is maintained within the Global Codes Tables and is set (maintained) by Police Service personnel.

2.3 Local Information Files

The Local Information File(s) component addresses the creation, storage, retrieval and display of local support information files. These files are required by Communications Centre Personnel to support their operational duties and are available through rapid recall. Information Files are primarily designed to assist Communications Centre Personnel in providing logistical support to operations.

The functions within this component of the application must allow the end-user to create, modify, delete, print, route and display the contents of one or all of the Information Files available within the system.

These Files contain information such as:

- Strategic Operational Policy/Planning;
- Tactical Procedures;
- Department Directory Information;
- External Contact Lists;
- Municipal Services;
- Member Shift Lists;
- Ambulance Services;
- Towing Services;
- Hazardous Commodity Data;
- Hazardous Addresses;
- Communications Centre Operational Procedures.

2.3.1 Content of Information Files

The Information File(s) Component must be designed to be very dynamic and easily allow for the creation of any support information files that may be required by a Complaint Taker or by a Dispatcher.

The following descriptions are provided as examples of the types of Information Files proposed for the Information Files Component of the CAD System.

2.3.2 Strategic Operational Policy File

This file is intended to address high level planning/policy within the department relating to the departments role in major or critical areas of operation.

An example of potential use is as follows:

- Disaster/Recovery Planning

  - ° Evacuation
  - ° Earthquake
  - ° Tornado
  - ° Major Airline Accident (residential area, etc)
  - ° Shipping Accident (major collision, oil spill, etc)
  - ° Poisonous Gas Spill (Chemical Plant, PCB's, etc)
  - ° Major Explosion
  - ° Combination of the above
  - ° etc

2.3.3 Tactical Procedures File

This file is intended to provide personnel with access to the Department's recommended procedures to follow when confronted with varying types of events.

Examples of potential use is as follows:

- Robbery/Shooting/Stabbing
- Serious Assaults & Sex Offences
- Domestic Disturbances
- Alarms - Bank/Intruder/Open Signals
- Hostage Situations
- Pursuit & Interception
- Bomb Threats
- Harassment & Obscene Phone Calls
- Landlord Tenant Disputes
- Riots
- Missing Persons
- Marine Rescues
- Suicide/Attempt Suicide Calls

- Parking Complaints
- Towing Of Vehicles
- Motor Vehicle Accidents
- etc

2.3.4 Department Directory Information File

This file is intended to provide personnel with access to Departmental information resource files that support the command and control environment within the Communication Centre Operation.

Examples of potential use is as follows:

- Emergency Departmental Key Personnel Contact Listings
- Internal Telephone Directory

2.3.5 External Contact Lists File

This file is intended to provide the user with listings of services and the contact persons by department, etc. within these services.

Examples of the type of Services involved is as follows:

- Municipal Services
- Provincial Services
- Federal Services
- Member Shift Lists
- Ambulance Services
- Towing Services
- Hydro Services
- Telephone Services
- etc

2.3.6 Communications Centre Operational Procedures File

This file is intended to provide Communications Centre personnel with internal Communications Centre operational policy and procedures, manual, bulletins. etc.

Examples of the type of information contained in this file is as follows:

- Tips on being a Professional Communicator
- Proper Deportment
- Shift Schedules/Hours of Work
- Workstation/Tasks Rotation Policy
- Telephone Conversation/Control Techniques
- 911 Complaint Taking
- Tracing Calls
- Dispatching Policy
- Patrol Unit/Member Status Keeping Policy
- Control of Air Time
- Supervisor Responsibilities
- etc

2.4 Call Transaction Time Analysis Option

Transaction time analysis is an important aspect of the CONSTABLE™ System. However, it will impact the system performance by requiring that each transaction necessitate an additional insert into the database. This insert will be used to log the transaction, the time of the transaction, the user identification of the requestor of the transaction, the terminal ID, and the system response time. If the Transaction Time Analysis option is a requirement of the Police Force, it is recommended that the system be configured so as to permit the central technical support staff to control the occasions when the Transaction Log is activated. This logging should be enabled only when required to gain suitable information for performance analysis. The system will automatically record user and work station identifiers. This facility will not be part of the prototyping exercise.

2.5 Message Handling

All CAD users must have the ability to compose free-form text messages and send these messages to any other user in the system. The system must be able to support prioritized messages and ensure that emergency messages are not ignored. The system must indicate that a message has been received by the designated workstation(s). The system must also indicate that a message is waiting. The user receiving the message will be able to re-direct a message to any other workstation or user on the system.

In the event that a user is not available, the sender of the message must have the option of permitting the system to log the message for the designated workstation/user, discard or re-direct the message.

2.6 Additional Information

- The calling up of a particular screen within our proposal is achieved by accessing a menu item within the Menu Bar. Screens to address specific types of calls are created if there are a sufficient number of unique data elements associated with a particular Event or Call type or if the volume of a particular type of call is sufficiently high to warrant the design of a screen unique to that type of transaction. Screens may be designed to meet any purpose. The number of screens and there exact structure will be determined during the finalization of the detail design.

- The condition relating to field interdependency edit rules can be set (an action resulting from another action) to result in the cancellation of a call-back condition upon concluded details being entered for a report. It is anticipated that an Alert Message would be generated and the transaction activated once "confirmation" is indicated by the user.

- The system provides for the recording of Reported and Occurred From/To Date/Times. Default conditions are also available for these fields (e.g. The system defaults the Reported Date/Time to todays date and time if not operator entered. The system defaults the Occurred From Date/Time - when the event happened - to the Reported Date/Time if not operator entered, etc).

- A special remarks field (text) is provided to permit the user to record free formatted information about the call. In the event the special remarks field is insufficient to record the required remarks, the Text Structure should be used.

- Call disposition codes if required are contained within the Global Codes. Authorized users have the facility to Maintain the Global Code Tables (add new codes, modify existing codes or delete codes (Note: some codes are not actually deleted, they are delegated to an inactive status).

- The system requires a Concluded Date/Time in order to generate a scheduled purge date. If the Concluded Date is todays date, the system generates todays time upon the user exiting from the time field.

- As previously mentioned the system maintains a series of date/time stamps (e.g. system add date/time, reported date/time, occurred from date/time, occurred to date/time, modified date/time, delete record date/time, hold date/time, date/time record is transmitted to dispatch, dispatch date/time, etc). Date/Time stamps can be created as per the Police Service requirements.

- As previously stated the security aspects of the system are controlled through a users access privileges. The user must enter both an identifier and a valid password. If a user signs on to a second workstation, the system will automatically log him/her off of the other workstation. At the option of the Police Force, the system can record all sign-on and sign-off transactions. Also, the system can record invalid attempts to sign on and any system forced sign offs.

3.0 The CPIC Rollover

The CPIC rollover feature provides for a single data entry panel to be used to trigger two separate transactions. The resulting transaction will be done immediately. The CPIC transaction rollover will translate any CPIC coded data and automatically prepare the CPIC transaction panel. The user will be given the opportunity to simply confirm the CPIC transaction, or enter additional comments/data on the transaction prior to transmission to CPIC.

This approach to the rollover is to be applied consistently throughout the system. The primary system transaction is to be applied immediately. The secondary CPIC System transaction is to be prepared and displayed to the user. The user can immediately confirm that the transaction is to be sent to the secondary system. Alternatively, the user can alter some of the contents of the transaction prior to signalling that it should be sent to the secondary system

The system will have full maintenance capability for the CPIC applications (e.g. Person, Vehicle, Property, Boats & Motors Files, etc).

The system will perform standard CPIC edits to maximize the probability that the transaction will succeed. In addition, the system will perform any required translation to convert any coded information from the system code values to CPIC code values. This is to be done through the use of the Global Codes table as previously described. This table includes all of the system codes together with equivalent codes, which are intended to provide the code that CPIC uses in the place of every system code as applicable.

The system can be endowed with the ability to print any maintenance transactions. These transactions are to be printed at the printer local to the workstation.

The automatic deletion and modification of information on CPIC based parallel transactions can be designed into the CAD System. The implementation would be the inclusion of a flag signalling CPIC relevance on Person, Vehicle, Marine and Property information within the Moncton Police System. When set within the System, modification and deletion transactions would trigger automatic generation of symmetric transactions into CPIC.

The proposed CPIC interface must be compliant with the requirements of the Narrative Traffic and Hit Confirmation transactions.

The system must to be capable of supporting designated formatted query screens for the exclusive use of the remote CPIC (IDN) network. These query screens should be implemented using table driven Front End software. Therefore, the design and layout flexibility will be extensive, and the syntactic validation will be immediately available. Custom applications will be required only to ensure inter-field and semantic validations are performed.

The proposed solution for the CAD System is to embody full NCIC access through the CPIC interface. The appropriate query screens will allow for optional usage of the "NCIC:Y" indicator.

A Requirements Definition will be necessary to determine the data elements and the criteria under which information within the System should be subject of the CPIC rollover feature.

4.0 Data Elements

4.1 Complaint Taking

4.1.1 Incident Codes

These incident metafile records are used as a source of default information for incident types. They are searched by the complaint taking function upon entry of an incident type code, returning the default incident information for that code. The records consist of the following data elements.

Field	Type	Size	Display Format	Source	Default
Incident Type	Char	7	AAAAAAA		
Incident Description	Char	256			
Priority Level: 1 character, from 1 to 9	Short	99			
Unit Types Req'd	char	8	list		

4.1.2 Incident Data

The incident records consist of the following data elements. These elements allow for information entered by the complaint taker, the system and the ANI/ALI interface of the E-911 system. The ANI/ALI information can be defaulted to the incident or the complainant location information.

Field	Type	Size	Display Format	Source	Default
Incident ID	Long			System	
Operator ID	char			system	user ID
Original Incident Type	alpha-num	7	AAAAAAA	User	
Original Incident Description	char	256		User	Incident Type Table

Final Incident Type	char	7	AAAAAAA	User	
Final Incident Description	char	256		User	Incident Type Table
Incident Priority	short	2			Incident Type Table
Incident Location	text, or structured		Constable™, Text	ANI/ALI interface	ANI/ALI interface
Incident Phone Number	char		(999) 999-9999	ANI/ALI interface	ANI/ALI interface
Complanant(s) Name	char		Constable™	ANI/ALI interface	ANI/ALI interface
Complainant(s) Address	char		Constable™, Text	ANI/ALI interface	ANI/ALI interface
Complainant(s) Phone Number	char		(999) 999-9999	ANI/ALI interface	ANI/ALI interface
Incident Disposition Code(s)	char		Global Code Table		
Agency/agencies notified	char	1 to 9 codes	list		
Linked Incident Numbers	integer		list		
Linked Incident Comments	char	256			
Dispatcher ID	char			system	user ID
Hardcopy File Nº	char			system	system

4.1.3 Supplementary Text

The supplementary Text serves as a method of attaching initial text, supplementary text, follow up text, report text and repeat/duplicate call text notes to the incident without necessitating large text fields within the incident records. The initial text record would most likely be created automatically upon creation of the incident so as to speed up the data entry process. It is a fully formattable text entry field.

Field	Type	Size	Display Format	Source	Default
Incident ID	Long			System	
Date	Date	6	DD/MM/YY		
Time	Time	6	HH:MM:SS		
Title	Char	256			
Text	Text	32000			
Operator ID	char			system	operator ID

4.1.4 Status Global Codes

The status Global Codes allow the user to define the terminology to describe the available status codes. The user can change these entires and the previous entry for a given status type would remain in effect for all incidents created using that code, as provided by the maintenance of the start/stop time for these fields.

Field	Type	Size	Display Format	Source	Default
Code ID	Long			System	
Code Name	char	10		System	
Description	char	256		System	
Alt Code	char	10		System	
Start Date	Date			System	
Stop Date	Date			System	
Related Code	char	10		System	

4.2 Time Records

4.2.1 Time Stamps

The purpose of the time stamp is to record all events relative to an incident or unit so as to show a change in status. Thus, an entire incident history can be recreated by piecing together the related timestamps and ordering them by the time of recording. The most recent status of any incident can be found by referencing its most recent timestamp. The same information is available for any unit as well.

Field	Type	Size	Display Format	Source	Default
Incident ID	Long		99 9999999	System	
Unit ID	Long			User	
Nº of members	short				
Associated member ID's			List		
Stamp Type	Char	40			
Stamp Description	Char	256			
Date	Date	6	DD/MM/YY		
Time	Time	6	HH:MM:SS		
Operator ID	alpha-num			system	workstation ID

4.2.2 Alarm Clock Records

The alarm clock records serve as both permanent and temporary reminders for required action. They can serve as a reminder to dispatchers to ensure that a status has been received from a certain unit within a certain time or they can serve to remind a system manager that incident number 99 999999 can be archived and removed from the system. They can be both system generated and user generated.

Field	Type	Size	Display Format	Source	Default
Incident ID	Long		99 999999	System	
Unit ID	Long			User	
Date of Alarm	Date	6	DD/MM/YY	system/user	
Time of Alarm	Time	6	HH:MM:SS	system/user	

Message	Char	256		system/user	
Oringinator	Char	256		system/user	
Destination	Char	256		system/user	

4.3 Units/Officers Data

4.3.1 Member Information

Each member is identified by their badge number. If deemed necessary, an internal unique id could be assigned as well.

Field	Type	Size	Display Format	Source	Default
Member Badge Nº	Char	10			
Member Name	Char	40			
Member Rank	Char	10			
Member Info. -age -address -phone -level -skills -associated platoons -etc.					

4.3.2 Unit Information

At the beginning of each shift, it is the responsibility of the stations to provide the Communications Centre with a list of available dispatchable units and officers assigned to each unit. Each unit must have at least one officer assigned to it, and each officer must be assigned to one unit. The unit may be a symbolic entity such as one officer foot patrol, or it may be the physical unit such as a squad car or van. The unit is the fundamental dispatchable entity. Members are entities associated with the unit.

Occasionally, it will be necessary for a Dispatcher to add a unit to or delete a unit from the available unit list. As well s/he may need to change information associated with a unit on this list.

The following is the full data set for the unit description:

Field	Type	Size	Display Format	Source	Default
Unit Call Letters	Char	up to 8			
Unit Type	Char				
Platoon ID	Char	1			
Sign-on date(s)	Date	n	YYMMDD		
Sign-on time(s)	Time	n	HH:MM		
Sign-off date(s)	Date	m	YYMMDD		
Sign-off time(s)	Time	m	HH:MM		
Voice Radio Channel(s)					
Alias (if applicable)					
Portable Radio alias(es)					
Reporting Officer					badge number

4.3.3 Resource Assignment

At the beginning of each shift, it is the responsibility of the stations to provide the Communications Centre with a list of available dispatchable units and officers assigned to each unit. Each unit must have at least one officer assigned to it, and each officer must be assigned to one unit. This relationship serves to record the current assignment of officers to units, and may fluctuate during a shift and is completely rewritten at the start of each shift. Some events (time stamps) may cause members to be unassigned to a unit for a period of time that s/he would be away from that unit. The member might be reassigned to a different unit or may be removed from the active member roster during that time.

Field	Type	Size	Display Format	Source	Default
Unit Call Letters					
Member Badge Number					
Sign-on date	Date	n	YYMMDD		
Sign-on time	Time	n	HH:MM		
Sign-off date	Date	m	YYMMDD		
Sign-off time	Time	m	HH:MM		

4.4 Geographic Data

4.4.1 Work Area

The Work Area assigns each unit to a geographic work area (ie Division, Zone, Patrol Area, etc.). The work area can be at any hierarchical level in the defined geographic levels, so that a supervisor unit might be assigned to a level 2 corresponding to a Zone and a foot patrol might be assigned to a level 3 corresponding to a Patrol Zone. This information will vary over the course of a shift and will be rewritten at the start of every shift.

Field	Type	Size	Display Format	Source	Default
Unit Call Letters	Char	8			
Geographic Unit ID	Long Integer				
Sign-on date(s)	Date	n	YYMMDD		
Sign-on time(s)	Time	n	HH:MM		
Sign-off date(s)	Date	m	YYMMDD		
Sign-off time(s)	Time	n	HH:MM		

4.4.2 Geographic Units

The geographic units are a fully definable geographic hierarchy that specifies all levels of geography to be considered by the system. Each unit specifies its parent unit so that the hierarchy is self-consistant.

Field	Type	Size	Display Format	Source	Default
Geographic Unit ID	Long Integer				
Unit Name	Char	40			
Parent Unit ID	Long Integer	40			

4.5 Local Information Files

The Local Information File(s) address the creation, storage, retrieval and display of local support information files, which are required by Communications Centre Personnel, through rapid recall, to support their operational duties. Information Files are primarily designed to assist Communications Centre Personnel in providing logistical support to operations.

These Files contain information such as:

> Strategic Operational Policy/Planning;
> Tactical Procedures;
> Department Directory Information;
> External Contact Lists;
> Municipal Services;
> Member Shift Lists;
> Ambulance Services;
> Towing Services;
> Hazardous Commodity Data;
> Hazardous Addresses;
> Communications Centre Operational Procedures.
> "Important" telephone numbers
> Emergency Services (telephone numbers and/or addresses)
> Other Agencies (telephone numbers and/or addresses)
> Force Hostage Negotiator Information
> Ethnic/Translator Services
> Force Operational Procedures/ Policies/ Notifications
> Bylaw Information
> Hospitals (address and telephone numbers)
> Parks (addresses and/or directions)

The file structures will be organized into a two level hierarchy consisting of headings and information files under those headings.

4.5.1 Local Information File Headings

The file headings serve to organize related information files together.

Field	Type	Size	Display Format	Source	Default
Category ID	Long Integer				
Unit Name	Char	40			

4.5.2 Local Information Files

The file records point to the files themselves.

Field	Type	Size	Display Format	Source	Default
Category ID	Long Integer				
Information Title	Char	40			
Information	Text	32000			
Path Name	Char	40			
Last Update	Date	6	DD/MM/YY		
Updated By Badge Number	Alpha	9			

4.6 Premise Information

It is the intention to maintain information on premises, so as to assist officers in responding to calls at these premises. Temporary information will be entered directly in CAD.

When an incident is created, the CAD system must search within its own data and within the "Premise System" for any records relating to that location. If there is information, the user must be able to display it.

Categories of information will include, but not be limited to:

        Premise Location system generated
        Premise Information Category describes the type of
                information, such as Hazardous, Special,
                Previous Incident, etc..
        Previous Incident
        Alarms
        Dangerous Person
        Entry Date and Time   system generated
        Expiry Date and Time   system generated, can be
                overridden
        Premise Information   textual description; will vary
                according to category; for alarms and previous
                incidents, the information will be system
                generated
        Reporting Officer(s): Badge number of officer(s) providing
                the information
        Division   division of the officer(s)
        User ID:

4.7 System Operation Parameters

These parameters will include, but not be limited to, the following types of information:

Workstation Default Functional Grouping Assignment
Divisions to Dispatch Position Assignment
Unit Types Definition
Beat Pattern Definition
Unit Assignment to Divisions, Zones, Patrol Areas
Recommended Units Criteria
System Time - referenced by all workstations

4.8 ANI/ALI system data

The CAD system must have the capability of recognizing a certain number of messages coming from the ANI/ALI system. For example, a message with service address will have the following format:

Field	Type	Size	Display Format	Source	Default
CAD position number	integer	00-99			
Call sequence number	integer	00 001 to 59 999			
SL-1 time stamp	Time		HH:MM		
Date	Date		YYMMDD		
Message type	Text				"Address available" ASCII 49
Telephone number	Char	10	999-9999		
Data type	Char				"Service Address", ASCII 49
Service class	Char	3			RES, COM, MUL, CPB
Municipality code					
Name	Char				

Address1	Char		House number, street name, location suffix, street orientation		
Address2	Char		Location type, location number, additional information		
Address3	Char		Service community, service municipality		
Postal Code	Char	6	xxx xxx		

All the fields will by separated by a carriage return and a line feed. Insignificant trailing spaces will be truncated.

4.9 The CPIC Rollover

The CPIC rollover feature provides for a single data entry panel to be used to trigger two separate transactions. The resulting transaction will be done immediately. The CPIC transaction rollover will translate any CPIC coded data and automatically prepare the CPIC transaction panel. The user will be given the opportunity to simply confirm the CPIC transaction, or enter additional comments/data on the transaction prior to transmission to CPIC.

Messages to the CPIC server consist of a header (342 characters) followed by the message area (up to 19,560 characters).

The header includes data such as:

Field	Type	Size	Display Format	Source	Default
Data Code	Char				"HD"
Input Format	Char		pre-formatted or in record layout		
Function					query, modify, etc.
Category					vehicle, boats, person etc.
Terminal ID					query originator

Satellite ORI					satellite originator (ORI) assigned to station
Source Code					application ID
Source Device					MDT, non-MDT, internal
MDT User Code	Integer	1			1 or 2
Reply Destination					route as given or sen to default printer
Database Code					denotes an operation; or testing environme
Multiple Transaction Code					CPIC or MTC or bot

The message area of a typical CPIC query varies depending on the type of query. A name query would include data such as:

Source ORI 7 alphanumerics
Function   20 alphanumerics
Category   20 alphanumerics
Surname   fixed key "SNME:", surname
First name   fixed key "G1", given name
Sex   male or female

A vehicle check query would include data such as:

Source ORI 7 alphanumerics
MTC ORI   7 alphanumerics
Licence #: 6 alphanumerics

The message area of a typical Message Routing will include data such as:

Source ORI 7 alphanumerics
Destination ORI(s): 7 alphanumerics, repeated as needed up
              to 8
Text   Free-form text

4.10 Alarms

False alarms are handled in a way which is consistent with the conceptual data model and wholly consistent with the architectural principles of the proposed CONSTABLE™. The set of all alarmed premises is kept in the
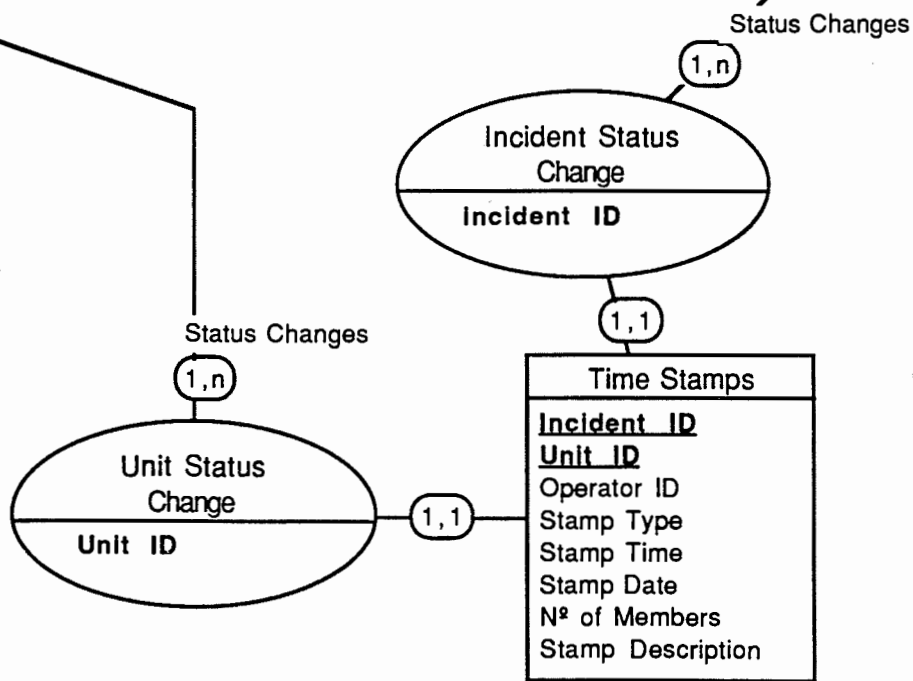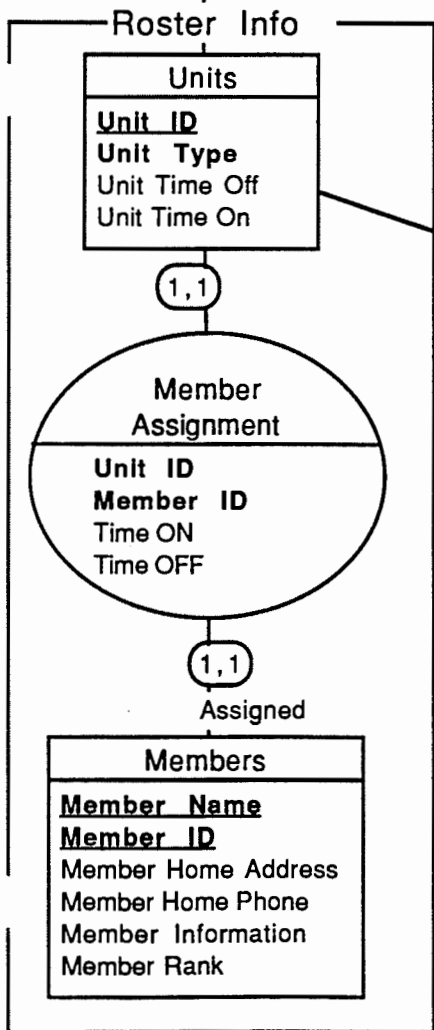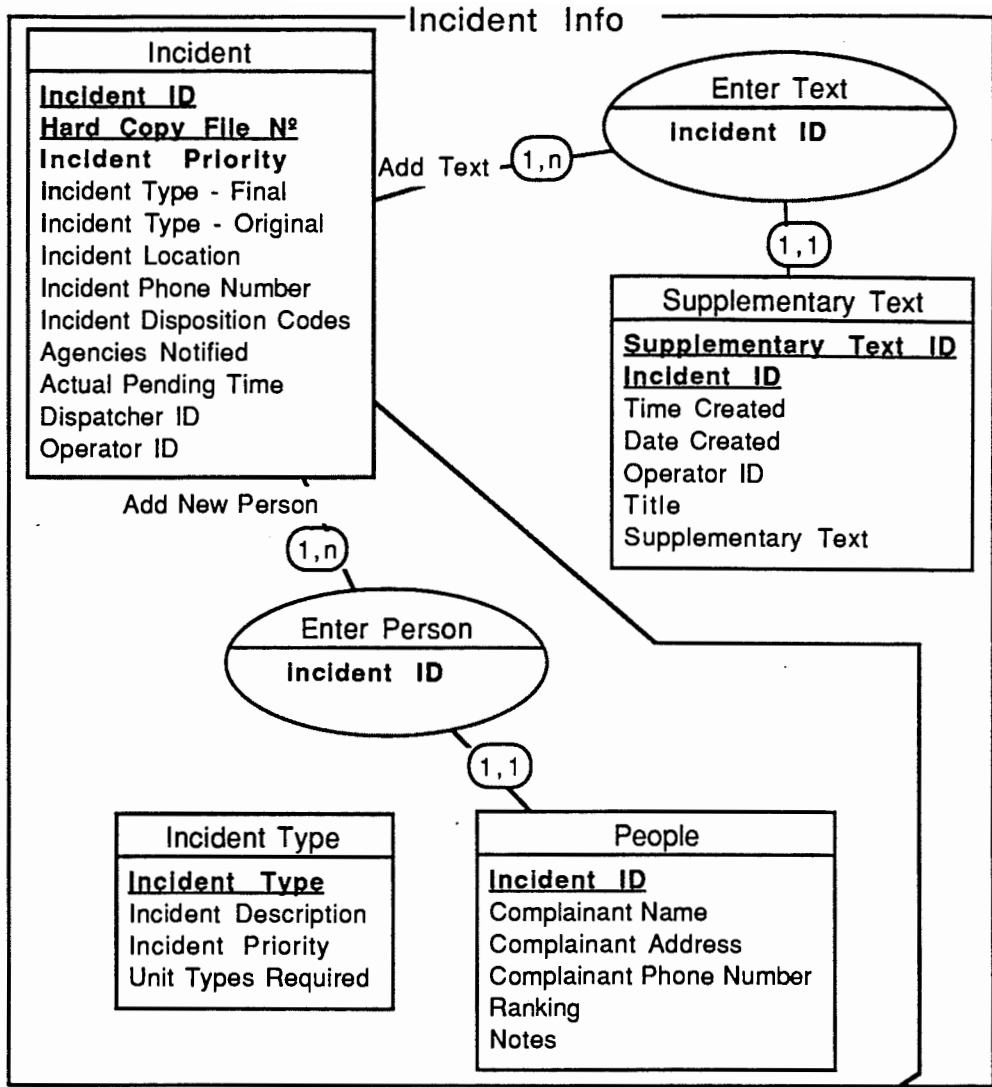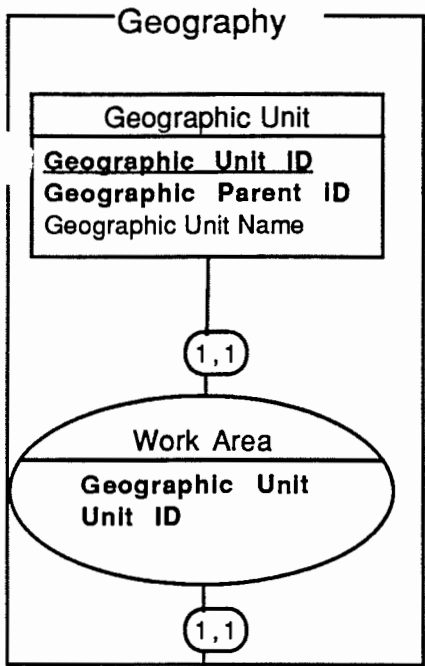
CONSTABLE™ database. Events are generated to maintain the fact that a premise is alarmed, including the name of the business or person where the alarm is installed, contact persons, telephone numbers, etc. Also included will be the code for the supporting alarm company as well as an alarm control number (ACN) which uniquely identifies this alarmed premise. The code for the alarm company will be validated against the family of global codes for alarm companies.

At the very least, the following data elements must be covered:

Field	Type	Size	Display Format	Source	Default
Incident Date	Date		YYMMDD		
Incident Time	Time		HH:MM:SS		
Call Priority	Integer				
Premise name	char				
Premise address	char				
Premise status					
Residence or Business	char				
Suspension start	Date		YYMMDD		
Suspension expiry	Date		YYMMDD		
Alarm Company ID	char				
Alarm Company name	char				
Alarm Company Phone number	char	10	(999) 999-9999		
Monitor Company ID	char				
Monitor Company name	char				
Monitor Company Phone number	char	10	(999) 999-9999		
Key holder advised	Bool		Y or N		
Key holder Phone number	char	10	(999) 999-9999		
Key holder ETA	time		MM.M		
Descriptive text	text				

APPENDIX A: ENTITY RELATIONSHIP DIAGRAM - CAD

The following pages describe the data Entities within the CAD Prototype and the Relationships between those entities. The Entity-Relationship Diagram (ERD) is divided into related zones of entities and relationships and the lines and symbols follow the standard notation of ERD's. The attributes listed within the entities are by no means fully resolved, in that they may use general terms to describe a detailed data structure. For example, under the Entity People, the address is listed as a single attribute, when it obviously is a complex data element consisting of both structured and unstructured address data elements. The full abstraction of the data elements will occur within the Logical Data Model (LDM) which will be done within the next phase of the prototype, following from this ERD.

Geography

Geographic Unit

Geographic Unit ID
Geographic Parent ID
Geographic Unit Name

(1,1)

Work Area

Geographic Unit
Unit ID

(1,1)

Incident Info

Incident

Incident ID
Hard Copy File Nº
Incident Priority
Incident Type - Final
Incident Type - Original
Incident Location
Incident Phone Number
Incident Disposition Codes
Agencies Notified
Actual Pending Time
Dispatcher ID
Operator ID

Add Text — (1,n)

Enter Text

Incident ID

(1,1)

Supplementary Text

Supplementary Text ID
Incident ID
Time Created
Date Created
Operator ID
Title
Supplementary Text

Add New Person

(1,n)

Enter Person

Incident ID

(1,1)

Incident Type

Incident Type
Incident Description
Incident Priority
Unit Types Required

People

Incident ID
Complainant Name
Complainant Address
Complainant Phone Number
Ranking
Notes

Status Changes

(1,n)

Incident Status Change

Incident ID

(1,1)

Roster Info

Units

Unit ID
Unit Type
Unit Time Off
Unit Time On

(1,1)

Member Assignment

Unit ID
Member ID
Time ON
Time OFF

(1,1)

Assigned

Members

Member Name
Member ID
Member Home Address
Member Home Phone
Member Information
Member Rank

Status Changes

(1,n)

Unit Status Change

Unit ID

(1,1)

Time Stamps

Incident ID
Unit ID
Operator ID
Stamp Type
Stamp Time
Stamp Date
Nº of Members
Stamp Description

Runtime Active Data

Active Incidents

Incident ID
Incident Priority
Incident Type - Final
Incident Type - Original
Incident Description
Incident Location
Agencies Notified
Incident Disposition Codes
Incident Phone Number
Incident Address
Actual Pending Time
Complainant Name
Latest Time Stamp Type
Latest Time Stamp Desc
Latest Time Stamp Date
Latest Time Stamp Time

Active Member Assignment

Member ID
Unit ID
Member Name
Member
Member Rank

Active Text

Supplementary Text Nº
Incident ID
Title
Text
Date
Time
Operator ID

Active Units

Geographic Unit ID
Incident ID
Unit ID
Unit Type
Unit Name
Geographic Unit Name
Latest Time Stamp Type
Latest Time Stamp Desc
Latest Time Stamp Date
Latest Time Stamp Time

Additional

Supplementary Information

Info Category ID
Info Category Name

Information Files

Info Title
Info ID
Info Category ID
File PathName
Last Update Date

System Codes

Dispatch Table

Unit ID
Incident ID
Prime Unit
Start Time
Start Date
Stop Time
Stop Date

Alarm Clocks

Incident ID
Unit ID
Alarm Time
Alarm Date
Message

Global Codes

Code ID
Code Name
Alt Code Name
Related Code ID
Description
Start Date
Stop Date

Unused File Nº

Hard Copy File Nº

COMNETIX

COMPUTER SYSTEMS

COMPUTER AIDED DISPATCH

PROTOTYPE SYSTEM

STRATEGIC ENVIRONMENT

Appendix "B"

February, 1991

Table of Contents

1.0 CONSTABLE™ CONCEPTUAL DATA MODEL

Comnetix Computer Systems would suggest that the collection of data elements documented below are to be considered illustrative of the information management requirements of a Police Service in support of their operations and that formal definition of data elements and their aggregations into entities would be performed during subsequent development activity. As such, the documented collections of data elements have been referred to within this document as "logical data groups".

The proposed System conceptual data model consists of a number of broadly distinct groups of entities. The central theme of the data model is to unify and integrate the various usages of similar data into coherent entities. The groups of entities for operational use include:

- **Information Management Tables**
    - these tables include all the entities which record events (e.g. calls for service, complaints, reports, activities, cases, etc.) and all related entities;

- **Validation Tables**
    - these tables include entities which are used to assist in the verification of certain data items (field edit and interdependency rules) for the system;

- **Local Information Tables**
    - these tables include the entities which are used in support of the operational personnel (hazardous address data, policy data, premise information, etc.) and are primarily referenced within the Computer Aided Dispatch (CAD) functions;

- **External Interface Files**
    - these tables include the entities which are provided in automated form by outside agencies for use within the system or which are generated in automated form for export to other external agencies (i.e. CPIC) by the Departmental Information Systems;

- **Ancillary Support Tables**
    - include all other entities which are used within the operational components of the system.

1.1 Information Management Tables

A great deal of analysis has been performed on those entities within the group called the **"Information Management Tables"**. The first objective of the analysis was to eliminate all replication of information within multiple entities.

Within a Records Management System (RMS) and a Computer Aided Dispatch/Status Keeping System (CAD), as with all other Information components, there are many instances of similar data elements with only slight variations across source documents. The proposed Information Management architecture strives to unify all similar entities. For example, the entity entitled *"Event"* contains many types of logical data groups known variously as "Activities", "Occurrences", "Incidents", "Calls for Service", "Case Files", "Provincial Offences", "Parole Reportees", etc. In other words, the entity known as *"Event"* is intended to reflect the intention of capturing any entity of work. This collection of similar logical data groups into single entities promotes the efficient management of that data. It also provides for effective and flexible selection of logical data groups for consideration during queries by the user. For example, the collection of all instances of person or business information, irrespective of source, into a single Person or Business entity promotes the flexible selection of system data files as required.

A second major objective of the analysis that yielded the architecture of the "Information Management Tables" is to organize the access paths among entities within the group. This careful consideration of data structure has distilled four component subgroups within Information Management. Every entity within each of the subgroups shares a common context within the overall Information Management architecture and offers a common base functionality. Indeed, the homogeneity of the entities within each subgroup has resulted in the definition of a set of design principles for each subgroup.

The first subgroup is called the *"Root"* subgroup, because it consists of all those entities which are required before any information can be retained in respect to an event (call for service, complaint, etc) or

project. The Root subgroup is intended to provide a starting point or to act as the anchor for an activity of work which is of interest to the Department. The *Root* **Subgroup** is the key or the central focal point of the Data Model.

By way of example, an **Armed Robbery Incident** is considered a **Root Subgroup** entity.

Constable RMS Architecture

Armed Robbery Event
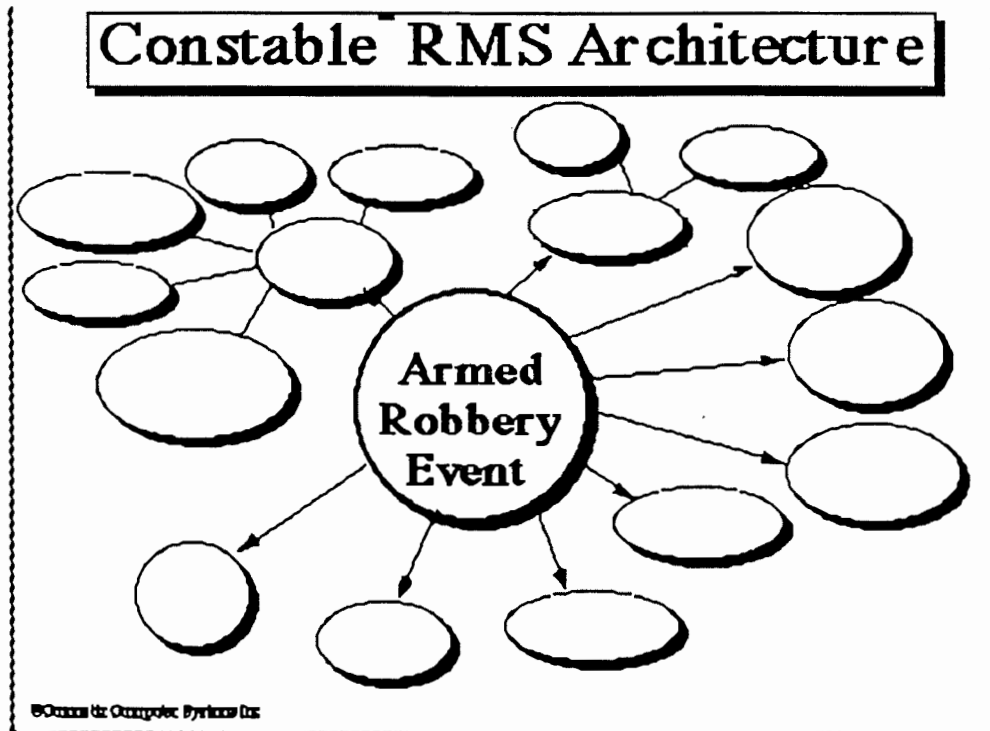
To provide further clarification, the Root Subgroup may include such entities as:

- Projects
- Joint Force Operations (Internal/External)
- Programs
- Events (Occurrences, Activities, Case Files, Alarms, Community Services, Parole Reportees, etc)
- Complaint Taking (Calls for Service),
- Crime Stoppers (TIPS) Program,
- etc.

No information can be retained by the proposed system until one of these "Root" subgroup entities is created. Attached to one of these "Root" subgroup entities can be a number of different entities, which collectively

are known as the *"Attachment"* subgroup. The attachment subgroup is intended to provide the capability of attaching entities which logically belong or are logically connected to the Root subgroup.

An example of the attachment subgroup may be an **Accused Person** in the **Armed Robbery.**

Constable RMS Architecture

Accused Person

Armed Robbery Event

© Comnetix Computer Systems Inc.
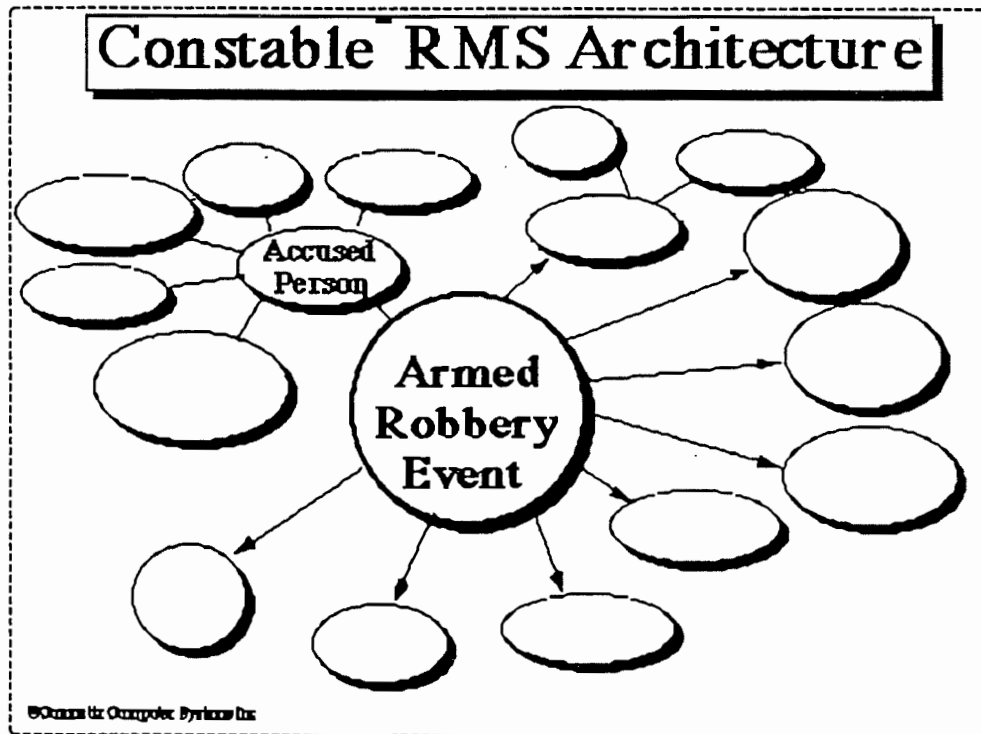
Further examples of entities which may be classified under the Attachment Subgroup are as follows:

- Persons
- Businesses
- Vehicles
- Vessels
- Property
- Warrants
- Modus Operandi
- Broadcasts
- Investigative Leads/Strategies
- Call Back Logs
- Interpreter Service Records
- etc

Constable RMS Architecture

Person, Business, Vehicle, Vessel, Warrant, Property, Armed Robbery Event, Ect., Leads Strategies, M.O.
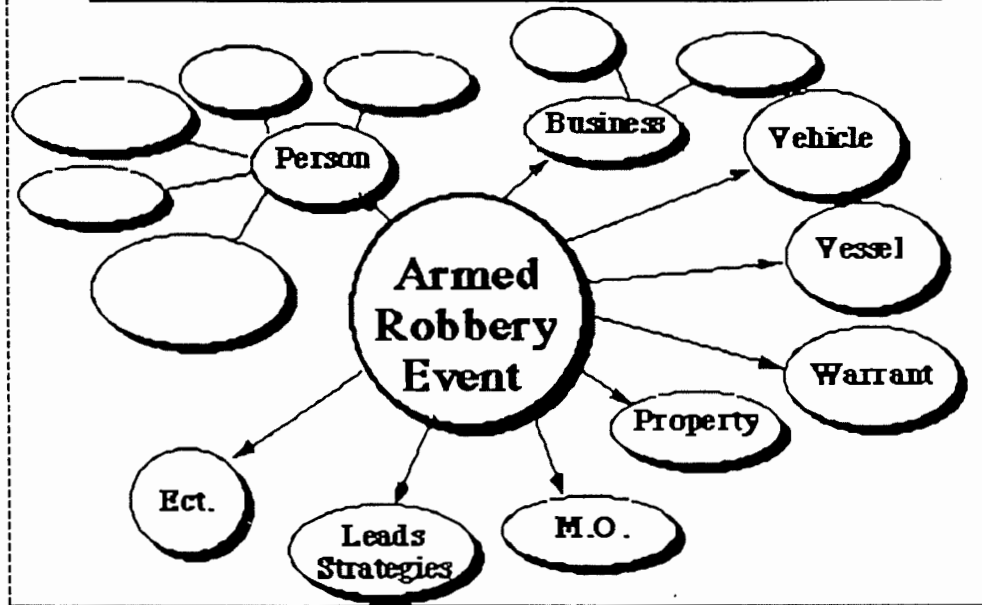
The principles of the application dictate that all attachment information, irrespective of source, will be retained within the one applicable attachment entity. For example, the only entity within the proposed System Data Model which will be permitted to retain Person information (e.g. the complainant, a suspect, etc), irrespective of source, is the Person entity within the Attachment subgroup. The adding of Attachment records are only permitted after a Root entity has been created, and any attachment is permitted to belong to one and only one Root entity. Any number of Attachments are permitted to a single Root. Each Attachment of a particular type is system-assigned a sequential, type-specific attachment record number at time of creation. Thus, the Persons belonging to the Root entity referred to as an Event are given a sequential person attachment number by the system at the time the user creates them.

Similarly, the Business Attachment records related to an Event are given a sequential business attachment number by the system at the time the user creates them, etc. The assignment of unique attachment numbers is applied to all entities at the attachment subgroup level. These attachment numbers are not reused by the system in the event a user deletes an attachment record.

Therefore, the event number, attachment type and attachment number serve as a permanent, unique and simple identifiers for any attachment record entity within the Information Management Group.

In essence, the Attachment subgroup of entities provides further details of defined Root level entities. But there is also a requirement within the System to associate additional information with Attachments. For this purpose, the proposed Data Model also includes a third subgroup, known as *"Subattachments"*. The role of the entities within this Subattachment subgroup is to further detail information regarding Attachments.

An example of a subattachment subgroup may be the **Charges and Disposition** of the Accused Person in the Armed Robbery.
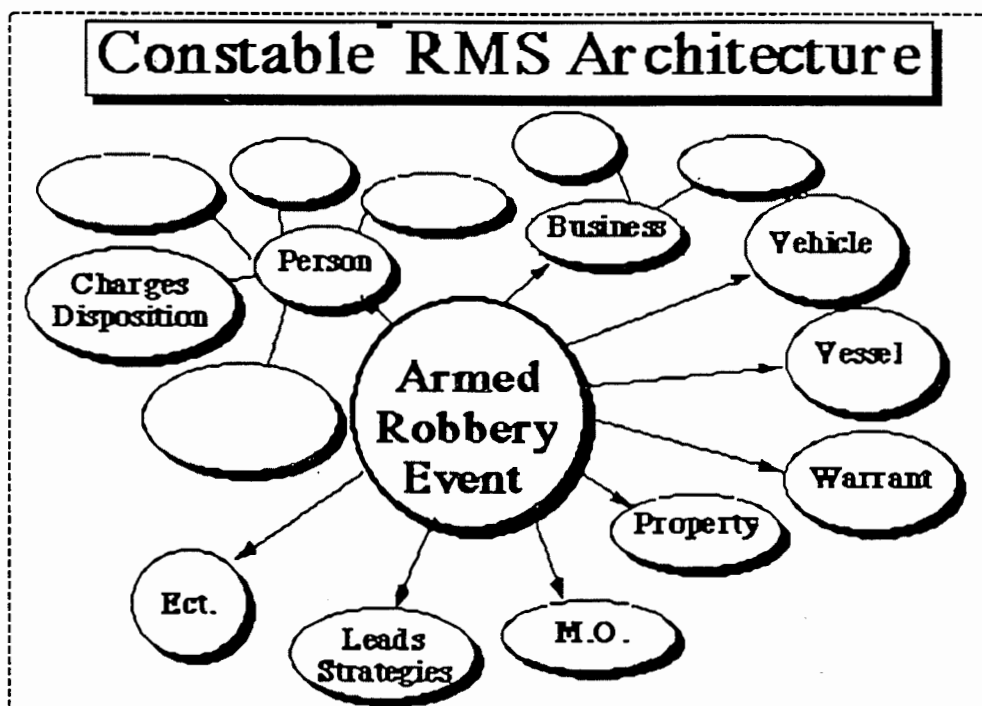
Further examples of entities which are contained within the Subattachment subgroup are:

- Arrest/Booking
- Charge/Disposition
- Person Alias
- Person Profile
- Person Detailed Description
- Training Received
- Language Skills

- Business Alias
- Bail Conditions and Reporting Schedule
- etc

Constable RMS Architecture
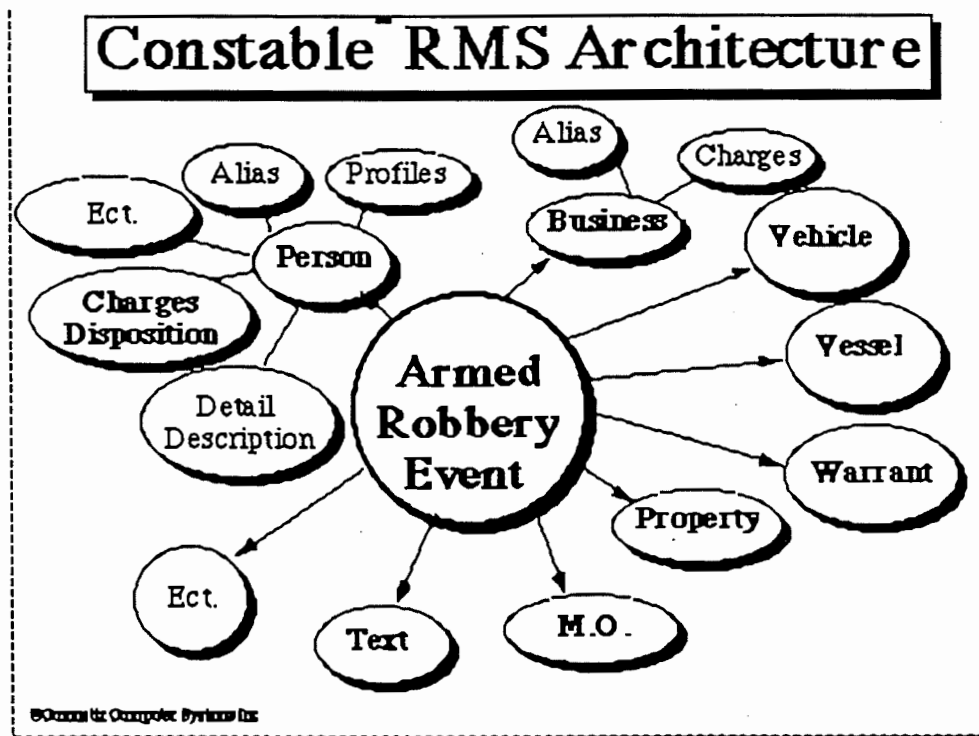
In a manner completely symmetric to the way in which Attachments must be related to one and only one Root, Subattachments may be related to one and only one Attachment. In addition, however, there is the added constraint that each different Subattachment entity can be related to only certain types of Attachments. For example, the "Language Skills" subattachment details the language proficiency of a person (i.e. within the context of an event wherein the interpreter was used). Therefore, it may only be related to a Person attachment. This example also points out one of the chief benefits of the broad architectural design of the Information Management group of entities.

By defining architectural principles for use, a great deal of generality is made possible. In the above example of language skills, the principle states that it may only be a subattachment to a person attachment. Since the principle applies only to the type of attachment, the provision of a facility to address the needs of interpreter events has implicitly endowed the proposed system with the ability to record language skills for any person attachment in the database. Therefore, such facilities as recording

the language skills of Block Parents, Police Specialists, Community activity related personnel, etc., could be immediately implemented (if desired) without impacting system design or requiring additional programming.

At this point, the Root, Attachment and Subattachment subgroups of entities within Records Management have been defined. They could be loosely considered to be three levels of a hierarchic structure. We have carefully defined the principles of use of all entities within this hierarchic organization and have gleaned side benefits of enhanced flexibility as a direct consequence.

One example of this flexibility is that the Data Model permits, from the end user prospectus, the appearance of grouping data elements from one entity group with data elements of other entity groups on the same screen for the purpose of efficiency of data capture. This is demonstrated through the Complaint taking aspect of the system. The complaint taking screen is designed to accommodate Event (Incident), Person, Location and some CAD specific (e.g. call priority, hazardous address, weapons, etc) data. In other words, the Complaint Taker has the facility to capture complaint taking related data through a singular well structured screen in a single transaction. The organization of other entity groups as required to meet a unique or high volume transaction type is also available.

To further enhance the flexibility of the Data Model, there are certain logical data groups which can apply equally to entities at more than one of the hierarchic levels. For example, diary dates are needed to manage investigators' activities with respect to events (root level), and they are also required to manage the release of vehicles from compounds or the tracking of an item of property released to a member for court purposes, property sent for analysis (attachment level) or the removal of Young Offender information, etc.

To address this requirement a fourth subgroup of entities was created and is referred to as *"Structures"*. This subgroup is intended to consist of all those entities which could be commonly applied to any entity in the hierarchy.

In line with our example of the Armed Robbery Incident and our accused Person, the application of a structure entity could be the **photograph (mug shot)** of the accused person. Further examples of the structure subgroup of entities are:

- Text
- Diary Dates
- Restrictions
- Relationships
- Locations
- Images

Text Structure
The Text Structure permits a block or blocks of narrative text to be associated with any entity at the Root or Attachment level. Thus, the textual summary of an event, the text contained within the Scratch Pad component of CAD, the text statement of a witness, the text of a report, court briefs, transcripts, investigative leads, the strategies developed in relation to an investigation, etc, can be retained naturally within this structure.

Diary Date Structure
A Diary Date Structure permits the user to record a due date or some date in the future that a specific action is required for an activity associated with any Root or Attachment entity. This is one of the central facilities in Case Management, where a date is set for an Investigator to implement a supervisor-specified strategy, a date in the future when the strategy is to be reviewed, a date in the future when an investigator is to have certain work completed or a date in the future in which a reportee is scheduled to appear and register with the Department. The diary date structure could also be applied to Broadcast Attachments to cause review of their content or to have the Broadcast purged from the system.

Further the diary date structure is used to manage young offender data which is subject to varying levels of purging, to manage vehicles in compounds, exhibits, property retention - destruction, Court appearances of Members, CPIC entries/purging, etc.

Restriction Structure
Restriction Structures are used in the management of access security within the system. Every authorized user is recorded in the Ancillary Support Tables' entity "User Security and Passwords". In addition to the standard items such as member number, name, password, expiry date, etc., each row in the table defines the profile of the privileges for access to certain functions. Thus, only those users with sufficient privilege to

perform the complaint taking, dispatch/status keeping, access to local files, broadcasts, or maintenance against Person, Vehicle, Property ...... attachments, etc., will be permitted to do so. However, there are certain unusual situations in which the Department may require restriction of usual privilege in respect to a specific event or attachment. To implement this, the restriction structure is applied to the entity that should be restricted. The user establishing the restriction is required to provide a list of the units or identifiers (member identifying numbers) of the users which are to be (exclusively) permitted to view the event or attachment being restricted. If a user that normally has sufficient privilege to view the entity that was restricted, requests the retrieval of the entity that has been restricted and if the user's identifying number had not been entered on the restriction list of permissible viewers for that entity, the system will respond that the data could not be found (e.g. Record Not On File). Only those users with sufficient privileges that are listed within the restriction structure are permitted access to the restricted information.

The Restriction Structure is also hierarchic. In other words, if an event is restricted, then also the attachments within that event and the subattachments within the attachments and any structures used within that event are also restricted. Whether the parent event is restricted or not, any or all attachments within that event may also be restricted. Restriction of an attachment will potentially deny access to that attachment and all relevant subattachments. If the parent event is also restricted, there is the constraint that the attachment restriction must be a subset (i.e. more restrictive) of the event restriction. The Restriction Structure could be applied to restrict access to an event with political implications, to a VIP involved in an investigation, to a Member subject of an internal investigation or sensitive intelligence, drug, etc., data.

Relationship Structure

Relationship structure is used to provide the user with the ability to logically connect entities to each other at the Root or Attachment levels. Relationships can be struck between two Root level entities or between two Attachment level entities, where those two Attachments are either within the same parent Root entity or in different parent Root entities. The Relationship Structure could be applied to create a relationship between events when it is determined that a suspect was responsible for or is implicated in the commission of several different offences. The Relationship structure may also be used to link two persons who are known associates and who generally commit crimes together or the vehicles used by persons of interest, etc.

Location Structure

The Location Structure is used to permit the user to define the geographic site for any entity within the system. The User may add four basic location types:

- A structured address (i.e. a street address);
- A Cross Street or Intersection;
- A Monument (i.e. civic centres, major buildings, parks, golf courses, shopping malls, hospitals, etc), and;
- An Unstructured Location (a specific spot in a field, a park, a golf course, lake, river bank, ravine, etc).

The location structure provides the user with the capability of adding additional information to the location for the purpose of adjusting the exact site (i.e. indicating that the event actually took place at the side of the building or in the back alley at 1440 Hurontario St., the North East corner of an intersection, etc., rather than the singular recording of just the street address or intersection as the location of the event).

The Location Structure also contains qualifiers which are used to indicate or clarify the reason that some locations are being added (e.g. Recovered Location, Towed From Location, the Location of a Found Item of Property, a Persons Permanent Address, a Persons Temporary Address - a student attending University, etc, a Persons Secondary Address - apartment, cottage, an out of town residence, a Frequented Location, an Associated Location in support of Intelligence activities, etc.). Locations are validated using the geographic database within the system in real time as the user enters information.

Image Structure

Image structures are used to allow the user to capture graphic information about entities in the data model. Since structures can apply equally to any root or attachment entity, images can be associated with an event (i.e. scenes of crime), persons (i.e. mug shots, fingerprint sets, surveillance, etc.), businesses (i.e. floor plans, etc), photographs of vehicles, vessels, photographs of property items, etc.

1.2 Validation Tables

Consistent with the avowed goal of data driven logic, the proposed system approach isolates all information used for validation from the entities which use that information. Thus, all meta data (i.e. data used for the validation of other data) has been collected into this subgroup. The validation data has been organized into two separate entities. The first is called *"Global Codes"*, since it contains the code values used globally throughout the system for validation. The rows of the global codes table are organized according to "family". Examples of families include Attachment Type Codes, Dispatch Priority Codes, Patrol Unit (Operational and Administrative) Status Codes, Person - Business - Vehicle - etc., Involvement Codes, Eye Colour Codes, Property Type Codes, Language Codes, Organizational Codes, Member Identification Numbers, etc. Each family consists of all the codes for the validation of a particular data type. There is also a master family, which contains (as elements) the set of all family names found within the global codes.

Therefore, it can be seen that this approach to coded validation permits the system maintenance staff to add coded values to a specific family, or create a whole new family without the alteration of any programs anywhere within the system.

There are further dimensions to the data independence offered through the use of the Global Codes Table. Included in each row of the table are other fields which provide data independence. First, every family of codes is designed to permit up to two key coded values. For example, a coded value for the Vehicle Colour data element could be specified as an alphabetic value (i.e. "DGRN" for "Dark Green") or a numeric value (i.e. "1"). By default, the system will permit entry of either the primary or secondary coded key values, but will always echo the primary value. Therefore, if the numeric code was retained in the Global Codes as the secondary value, then if the user entered the numeric value for a Vehicle Colour element in a panel, the numeric would be accepted, validated and replaced on echo with the corresponding alphabetic code. This permits fast entry (using numerics alone), but still provides for ease of human verification of entry. This approach also promotes "ease of data selection" when the members are completing hard copy reports.

The Global Codes also permit the specification of a short description of the use or relevance of each of the codes. Therefore, **On-Line Code Help** is implicit within the Global Codes themselves.

In order to promote the flexibility of interface to the CPIC System, the Global Codes table also includes attributes which are used to correlate the CPIC codes (e.g. Adding a Wanted Person/Stolen Vehicle to CPIC) with the appropriate Police Service application code. In other words, for every row in the Global Codes table which contains a Police Service code that should be translated into another value prior to "Roll Over" into CPIC, there will be a non-null value in the equivalent code attribute. Again, it can be clearly seen that the system maintenance staff will be in a position to alter the CPIC interface codes merely through the alteration of the equivalent code value in the appropriate row of the Global Codes table. This approach can clearly be extended to support other key automatic external interfaces in a symmetric way.

In addition to the Global Codes, a separate entity is used to maintain the list of **Non Police Related Organizations (NPO's)** used as operational support by the Department (i.e. Towing Companies, Fire Departments, Ambulances, Marinas, Hydro, Telephone Company, Children's Aid Services, Municipal Services, Federal/Provincial Services, etc.). As is the case for the Global Codes, the NPO entity consists of a family name (i.e. the type of organization), together with a code which identifies the particular organization. The family codes for the various types of organizations retained in the NPO table are retained in the Global Codes table. Each entry in the NPO table defines one organization, including the full organization name, the location of the organization, the contact name and alternate if required, and the organization telephone number, etc.

1.3 Local Information Tables

The Local Information tables are used primarily in support of the **On-Line Information Requirements** of operational Members through CAD. Through the entities within this group, the proposed architecture will preclude the hard definitions within programs of any information of relevance to the Members. The entities in this group may include:

- Hazardous Locations;
- Departmental Policy Information;
- Directory Information;
- Departmental Procedural Information;
- Materials Handling (i.e. chemicals).
- Disaster Planning
- etc

The Policy Information contains a short topic attribute for every row in the table. These topics relate to each other in a hierarchic fashion through the use of a "refers to" attribute in each row. Therefore, the system maintenance staff can not only define the content of the Policy text for a particular topic, but also define the hierarchy of topics which will be dynamically generated for the user when they request a table of contents, or wish to scan the entire Policy hierarchy.

1.4 Ancillary Support Tables

This group of entities essentially comprise all the tables which are used in support of the operational functional requirements of the Police Information Management System that are not included in the Records Management group of tables. The list of such entities can include:

- Layer Header;
- Area Header;
- Area Geography;
- Units;
- Duty Schedule:
- Daily Duty Roster;
- Equipment Inventory;
- Equipment Shift Sign outs;
- Dispatch Stations;
- Dispatcher Responsibility;

- Observation Header;
- Observation Geography;
- Report Criteria Header;
- Report Criteria Details;
- Resource Deployment;
- Bulletin Distribution Header;
- Bulletin Text;
- Document Tracking;
- Workstation Sites;
- User Security and Passwords;
- No Hits Name Inquiry (if required).

1.5 External Interface Files

The entities within this group include all the automated files which are employed to provide interfaces to external systems. These include but are not restricted to:

- Area Master File from Statistics Canada;
- Output file of Departmental Statistics (Statistics Canada Incident Based Reporting - as required);
- Local Municipal interfaces;
- Canadian Police Information Centre (CPIC).

2.0 THE ROLLOVER FEATURE

2.1 The CPIC Rollover

The CPIC rollover feature provides for a single data entry Constable™ panel to be used to trigger two separate transactions. The Police Information System transaction will be done immediately. The CPIC transaction rollover will translate any CPIC coded data and automatically prepare the CPIC transaction panel. The user will be given the opportunity to simply confirm the CPIC transaction, or enter additional comments/data on the transaction prior to transmission to CPIC.

This approach to the rollover is to be applied consistently throughout the system. The primary Police system transaction is to be applied immediately. The secondary CPIC System transaction is to be prepared and displayed to the user. The user can immediately confirm that the transaction is to be sent to the secondary system. Alternatively, the user can alter some of the contents of the transaction prior to signalling that it should be sent to the secondary system

The end system will have full maintenance capability for the CPIC applications (e.g. Person, Vehicle, Property, Boats & Motors Files, etc).

The system will perform standard CPIC edits to maximize the probability that the transaction will succeed. In addition, the system will perform any required translation to convert any coded information from the Police Information System code values to CPIC code values. This is to be done through the use of the Global Codes table as previously described. This table includes all the Police Force Information System codes together with equivalent codes, which are intended to provide the code that CPIC uses in the place of every local Police Information System code as applicable.

The system can be endowed with the ability to print any maintenance transactions. These transactions are to be printed at the printer local to the workstation.

The automatic deletion and modification of information on CPIC based on parallel transactions on the local Police Information System can be designed into the local Police Information System. The implementation would be the inclusion of a flag signalling CPIC relevance on Person, Vehicle, Marine and Property information within the local Police System.

When set within the local Police Information System, modification and deletion transactions would trigger automatic generation of symmetric transactions into CPIC.

The proposed CPIC interface must be compliant with the requirements of the Narrative Traffic and Hit Confirmation transactions.

The system must to be capable of supporting designated formatted query screens for the exclusive use of the remote CPIC (IDN) network. These query screens should be implemented using table driven Front End software. Therefore, the design and layout flexibility will be extensive, and the syntactic validation will be immediately available. Custom applications will be required only to ensure inter-field and semantic validations are performed.

The proposed solution for the local Police Information System is to embody full NCIC access through the CPIC interface. The appropriate query screens will allow for optional usage of the "NCIC:Y" indicator.

A Requirements Definition will be necessary to determine the data elements and the criteria under which information within the local Police CAD System should be subject of the CPIC rollover feature.

3.0 DATA PURGE/ARCHIVING

All Police Systems are required to provide for purging and archiving of their information. As such, this effort attempts to define a set of fundamental premises to the strategies attendant to the purging & archiving of data:

- Data will be purged on a regular basis;
- Purged data must be removed in such a way as to permit its restoration on an ad hoc basis in the future;
- Purging will be performed by the system using information which is set automatically and which may be modified manually;
- Certain purged root entities (together with their attachments and subattachments) will be archived. It is envisioned that some purged root entities will not be archived;
- Archived data will be retained in perpetuity off-line;
- Selective purging will not be supported for attachments to their root entity. Attachments will be purged when their root entity is purged.
- No selective purging will be supported for subattachments to their attachment entity. Subattachments will be purged when their Attachment entity is purged;
- The cycle for purging may be different (shorter, more frequent) from the cycle for archiving.

3.1 Purge Dates

Every concluded entity at the root level contains a scheduled purge date. This date is used by the automatic purging programs to select the root level entities which are to be purged from the system.

Every entity at the root level contains one event type code identifier, which permits the user to quickly and uniquely describe the principal nature of any event. The entity code list (in the global codes) will contain the following information:

- Code.
- Literal description of the code.
- Code retention period (in units of months of retention)
- Archive required flag.

The root level entity retention period is set to the value for the root code. While the entity at the root level is "open", the scheduled purge date is set to reflect permanent retention. When the entity is "concluded", the scheduled purge date is set to the concluded date plus the entity retention period.

Root level entity retention periods may be set to reflect an indeterminate period of time (e.g. Purge Date: 9999/99/99).

3.2 Purging

While purging, the system should traverse the database, searching for concluded entities at the root level whose purge date has expired. The set of all such entities forms the list of purging candidates.

If the entity is an Identification Header with an FPS number, Local Criminal Record number or Automated Fingerprint Identification System (AFIS) number, then the entity will not be purged because it forms part of a criminal history file (Policy Question). The entity assumes the retention period of the Criminal Record and will be purged as part of the Criminal Record Purge Criteria.

If the entity does not form part of a criminal history, and the entity and its attachments are unrelated (i.e. have no relationships) to any other entities or attachments, then the entity is automatically purged on the scheduled date.

If the entity or one or more of its attachments have a relationship to other entities, or attachments in other entities, then this entity will be purged if and only if all other related entities also are to be purged.

A purging log will be generated, chronicalling the execution of this program.

Log notations will be made for root level entities:

- which have been purged;
- which should be purged according to their scheduled purge dates, but which have been retained or converted to a Criminal Record retention period due to their relevance to a criminal history;

- which should be purged when considered in isolation, but which have been retained because of their relationship (either direct or though attachments) to entities which are not purgeable.

A separate active archive database structured identically to the on-line Police Department Information System database is to be allocated. The act of purging an entity will depend on the state of the "archive required" flag for the root entity code. If the flag is reset, then purging the entity will consist solely of the deletion of the entity and all its attachments from the on-line database. On the other hand, if the flag is set, then purging the entity will consist of copying the entity and all attachments to the archive database as well as the removal of the information from the on-line Information System data base. Thus, the active archive database will permit on-line access to "recently" purged information that has been archived. Since it has the same structure as the live database, the same programs as will implement the Department system's live functions will also serve to permit users to interrogate archive information.

On a periodic basis, the archive database will be backed up to off-line media such as optical disk or tape. On these occasions, it is envisioned that the archive database will be cleared, in preparation for the next cycle(s) of purging against the live database. The degree of accessibility of the archived information to the Departmental technical support staff is a matter to be determined by the Department. However, if so desired, the above strategy can be extended to allow the system to maintain all archived data on-line for an arbitrary number of years. Through the use of optical disk technology, the information archived from the unified Police System can be mounted on drives in short order.

3.3 Archiving

Archiving the purged data consists of copying the purged information within the archive database in some format to automated media, then clearing the archive database.

3.4 Access to Purged Data

No access will be possible to data relating to root entities with an entity code that had the "archive required" flag reset to "off". These root entities together with all their attachments, would have been deleted from the on-line data base without being copied to the archive database at purge

time. Direct, on-line access will only be possible to those purged entities which had an entity code whose "archive required" flag was set. If the root entities required for access have not yet been archived, then they would be found in the current archive database. If the entities required had already been archived, then the appropriate archive backup facility should be reloaded into the archive database.

Since the structure of the archive database is identical to that of the on-line system database, the system software will provide read-only access to the purged information without change.

The challenge in providing archived information to Members lies in determining which archive set to restore to the archive database. In some current technologies, access to purged information is provided through microfilm. Images are taken (in report number order) of the reports which are over five years old. A second set of images are also taken (in alphabetic order of surname or business name) of the index cards.

This system has a number of benefits:

- it provides for a simple method of purging reports, since all the reports to be purged are located contiguously in the filing areas;
- it provides for a numeric retrieval of the image of an report within each year;
- it provides for an alphabetic retrieval of subjects attached to reports that have been purged;
- it permits Records personnel to easily and quickly determine which volume of microfilm should contain the desired report.

This system also has a few disadvantages:

- the filming of subjects from the index card files is a tedious task for the Records Management Staff;
- the selection of records (and consequently subjects) which are to be purged is made strictly on the age of the record, and does not take into consideration:

  - the severity of the incident (i.e. should this incident be kept "on-line" longer)
  - the value of this report in archive (i.e. should this report be destroyed and not archived);

- no indexing is provided to the purged data on any other key such as vehicle license plates or location.

This has the effect of increasing the frequency of accesses to the microfilm, since serious reports are removed sooner than they potentially should be. It also has the effect of making the microfilm index larger than it should be, since trivial reports are retained as well as significant ones.

This proposal is such that the archived data be placed on a database which is stored on write-many optical disks. This technology is emerging quickly, and is now suitable for use in archive retention. The principal characteristic of this technology is its high storage capacity at a low unit price. The adoption of the write-many optical disk would permit several copies of the archive to be inexpensively made, and would also eliminate several other shortcomings of other strategies:

- It would directly permit read-only access to archived data using standard system software. There would be no need for time-consuming reloads of archive tapes onto the main system disks;
- If necessary, it could be altered by authorized Department personnel to provide for any eventualities arising from the Freedom of Information or Young Offenders Acts, etc.;
- The same media could also be used to archive images, thus providing an integrated solution to the data retention needs throughout the Department.