INFORMATION SYSTEMS DEVELOPMENT

INTERIM REPORT

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I N T R O D U C T I O N

It had been recognized for some time that existing records management services were unable to cope with the requirements of the Department. There existed a degree of uncertainty as to the size and scope of the problem and, consequently, the direction in which to look for a solution. As the first steps towards a solution, the Coordinator of Information Systems was appointed in September, 1974. A broadly-defined five-phase plan from the feasibility study to implementation was drawn up, and an agreement was entered into with the Bureau of Management Consulting for the necessary consulting services.

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SUMMARY AND RECOMMENDATIONS

The conduct of Canada's external relations involves a continuous complex process of gathering and collating information derived from a multiplicity of sources. The nature and timeliness of the information directly affect the quality of action taken or of advice tendered to Ministers. The efficiency of the Department is thus largely dependent on the existence of an adequate information storage and retrieval system.

In executing its mandate the project team concentrated much more on identifying "user" requirements than upon the operation of the Records Management Division or upon the nature of modern automation equipment. To this end a broad survey was conducted of the "users" in the Department, with emphasis on the desk officers, but covering also senior levels and the requirements of the various specialized operational units.

The Departmental survey resulted in confirmation that the initiation of the project had been fully justified. The records management sector had been starved of manpower and other resources over a period of many years when all other Departmental activities had been undergoing continuing rapid expansion. As a result the system had not itself been able to generate solutions to its many problems. It was abundantly evident that to correct this situation substantial changes would have to be made and that these should be carried out through a coherent overall plan. It was also clear that the planning should be based on dynamic rather than static concepts. Any major changes made at the outset should be such as to accommodate future organizational and technological developments as well as the continuously evolving Departmental requirements. To achieve optimum development over time, the new system should be designed to promote a close and constant interactive relationship with the substantive and policy formulation sectors of the Department.

In the course of the Departmental survey it was found useful to distinguish between Bureaux engaged in substantive programme activities and those providing support or "housekeeping" functions. From another perspective Departmental activities were seen as ranging from desk officer responses to events at Level I to analysis, policy coordination and foreign policy management at Levels III and IV. (See Figure 3 on page 29)

As a first step towards devising a system to meet Departmental needs a statement of "System Criteria" was drawn up. These were seen as falling into three categories and were analysed in some detail. Briefly, they were identified as:

a) General Criteria Applicable to Any Information System

Economic safekeeping of records; timely delivery of material; assured access upon request; archival requirements satisfied; a flexible subject classification system; capacity to accommodate future development.

b) Criteria of Special Importance to External Affairs

Controlled access for researchers; satisfactory security arrangements; accommodation to a wide range of complex material.

c) Criteria Largely Specific to External Affairs

Compensation for rotational service; support for Departmental coordination role; support for certain operational functions; presentation of key information to support foreign policy role and to assist foreign policy correlation by senior management.

In examining Departmental needs in the light of these criteria a wide range of technical possibilities was studied in conjunction with systems being employed or developed in other institutions. There is no system now in use or being planned which could be adapted to meet the particular needs of this Department but the experiences of several others confirm many of the conclusions drawn upon in the drawing up of the "Preferred System". Briefly, the principal elements of the recommended or "Preferred System" are:

a) The creation of Information Control Offices within the Bureaux to provide the necessary close and direct contact with registry personnel and immediate access to current files;

b) The recruitment and development of non-rotational quasi-professional Bureau Information Control Officers:

c) The use of a computer for the indexing and retrieval of information

through on-line CRT terminals in the hands of the Bureau Information Control Officers;

d) The application of the computer and related techniques to support the Level III and IV policy formulation and coordination functions.

e) The use of microfiche to provide each Bureau Information Control Office with a complete set of the Departmental "closed" files. Reader/printers would be available so that users could either view documents in the microfiche or have immediate paper copies made.

f) The rigorous improvement in quality of subject files through proper flexible use of the full capacity of the Records Classification Guide. "Current" files to be of relatively short duration and limited in size before their conversion to microfiche to increase general availability throughout the Department.

Implementation of the "Preferred System" would raise a number of considerations which are briefly identified as follows:

a) Financial: The "B" Budget forecast for FY 1976/77 anticipates preparatory expenditures of $408,000. The computer would be purchased in FY 1977/78.

b) Personnel and Organization: An estimated eleven extra man-years will be required, including a Director of Information Systems, and twenty-two upward reclassifications of non-rotational positions, all to be completed well before FY 1977/78.

c) Security: Shielding for the computer and secure links to the terminals, as well as other measures will be required.

d) Bilingualism: The system will require special features to accommodate the use of both official languages.

e) Involvement of Posts: Significant changes in the drafting of telegrams may be necessary. Posts should benefit from improved advance training of their registry personnel and the introduction of microfiche techniques.

f) Computer Priorities: Treasury Board may require that arrangements be

made to serve other users in the Department but first priority will always have to be accorded to the substantive information system.

g) Space Requirements: A preliminary study suggests that the computer, microfiche equipment and the proposed Bureau Information Control Offices could be accommodated without disturbing existing arrangements unduly.

Phase II will be devoted largely to working out the implementation plan and the detailed specifications to make it effective. The more important areas where questions remain to be dealt with are personnel reclassification and organization; selection of the optimum computer system and indexing technique, and resolution of the "thesaurus" problem; Treasury Board and Public Archives approvals; the selection of the optimum micrographic system. A "critical path" analysis would be established and a presentation prepared for about mid-June for final decision by senior management prior to the drawing-up of detailed specifications for the computer system.

CHAPTER I

THE NATURE OF THE PROBLEM

Information and the Conduct of International Relations

2. Marshall McLuhan first made his often quoted comment some fifteen years ago and has tried out several variations since then. For External Affairs perhaps none would be more apt than an inversion of it to read: "The message is the medium." The Department does have important public service operational programmes such as the issuance of passports and the protection of Canadians abroad. However, to an extent perhaps unique in government, it is the origination, transmission, assimilation and employment of ideas, mostly arising in the form of communications (that is, messages), which constitute the major preoccupations and activities of the Department. The conduct of Canada's external relations involves a continuous complex process of gathering and collating information derived from a multiplicity of sources. The nature and timeliness of the information directly affect the quality of action taken or of the advice tendered to Ministers. Little should be needed to demonstrate that international affairs, and Canada's part in them, are becoming more complicated and more varied year by year. A striking example is provided by the Middle East. While Canada did become officially involved in the peace-keeping aspects of the 1956 war, virtually every Canadian has been and will continue to be affected by the interactions of politics and oil following the 1973 Arab-Israeli conflict.

3. The quality of the Departmental performance in the conduct of international relations can be seen as being dependent upon five main factors:

a) The nature of Departmental management;

b) The operational and administrative structures of the Department;

c) The general competence of the Foreign Service officers assigned to carry out the Departmental programmes;

d) The accuracy and comprehensiveness of the analyses of factors bearing on Canadian interests in the world, and the decisions arising therefrom;

e) The accuracy and comprehensiveness of the store of knowledge and information assembled by the Department through its world-wide information network and personnel rotation system.

The last two factors closely depend upon the flow and use of information which grows year by year. No matter what heroic efforts are made elsewhere, if shortcomings persist in this area there will only be increasing frustration as the achievement of optimum results continues to be elusive, and even appears to recede in an ever-expanding environment.

4. It would be quite unrealistic to imagine that the growth in the flow of communications to and from Departmental headquarters and internally can be significantly curbed. As the capacity of the communications system is augmented the pressure on the means to store and retrieve information can only become greater. Failure to cope adequately with these developments would soon lead to progressive deterioration of the quality of performance of Departmental programmes, despite the best efforts to overcome the constraints of the system. The inadequate support for Departmental programmes could perhaps be tolerated a little longer because the internal shortcomings would not necessarily become evident in any dramatic way. However, the Department must now measure up to a challenge with respect to its important coordination function. This has been spelled out quite explicitly as Government policy in the decision on the conduct of Canadian relations with the United States, the most important of all our international relationships. While improved internal efficiency is an obvious general objective, it is equally clear that there is much scope and indeed need for innovation in the handling of information if an adequate performance is to be maintained in the coordination role which by its nature extends outside the Department.

5. Traditionally, the Department has handled the storage and retrieval of information through the standard Registry or Records Management Division. The results of past efforts to develop procedures to respond to the pressures and demands with which this operation has increasingly been faced have reinforced the belief that solutions may well lie along radical lines.

History of Records Management in the Department

6. Records management has, at several periods, attracted considerable development effort but has continued to be viewed by most working-level officers as an area of less than satisfactory performance. One explanation for the admitted failings has been that historically those responsible for operating the registry system have had to cope with a succession of difficulties mostly originating outside the system itself. Annex I describes how no less than seven studies (including sections in the Glassco Commission and Urwick-Currie Reports) have been devoted over the years since 1950 to the question of improving records management in the Department.

7. In the early post-World War II years a centralized filing system was located in the East Block and worked reasonably well for a time but the service deteriorated progressively with the very rapid expansion of the Department, both at home and abroad, accompanied at the same time by a rising flow of communications of all kinds which reflected the quickening pace of Canadian involvement in international affairs. Faced with pressing world-wide Departmental needs the Personnel Division in the late 1950's was perennially unable to provide sufficient staff to fill the accepted establishment, and those assigned to the Registry were almost always one or more grades below their designated levels. It also became evident that the "1940 Series" file classification system had become wholly inadequate to meet current international conditions. In response to this latter situation the massive task of introducing a completely new Records Classification Guide was embarked upon in the early 1960's.

8. The same period saw both further Departmental expansion and the move of a number of Divisions out of the East Block. The only possible way of dealing with the Departmental dispersal was to institute the Sub-Registry system. While decentralization solved some problems it also created new ones. Moreover, it did little to ameliorate the pressures resulting from the concurrent significant expansion in the capacity of the new communications system and the almost consequential rise of traffic to utilize this new capacity to its fullest. The late 1960's were therefore characterized by eager anticipation to exploit the potential for improved records management presented by the prospective move to the new Lester B. Pearson Building.

9. For the Records Management Division, the move to the new location meant an organizational change towards a highly centralized system. Centralization made it possible (or depended upon, according to how one viewed it) the introduction of a considerable amount of new mechanical equipment. The principal items were the Randtriever, the Kard-veyer and the pneumatic tube and conveyor delivery systems, altogether representing a capital investment of some $750,000.

10. Unfortunately it quite soon became evident that neither centralization nor mechanical equipment was going to bring the improvement in Registry performance the great majority had thought would follow the move to the new building. Initial mechanical teething troubles did nothing to dispel the growing view in many quarters that Registry services had become worse rather than better.

11. Following the organization of the Department into geographic, functional and administrative Bureaux in 1971 it became possible for greater emphasis to be placed on various managerial and operational functions. This made it possible for records management problems for the first time to be given adequate attention at appropriate higher levels. As soon as it had become apparent that centralized mechanization alone would not solve the problems, the first steps were taken towards the introduction of an automated information storage and retrieval system. For the purpose of the "B" Budget forecast for 1975/76 an initial cost of $250,000 was estimated for computer "hardware", "software" and related equipment. The agreement signed with the Bureau of Management Consulting envisaged the development of a coherent programme containing the following elements:

Phase I	Problem Definition and General Specifications
Phase II	Selection of Solution and Implementation Plan
Phase III	Detailed Specifications
Phase IV	Development
Phase V	Implementation

Execution of the Mandate

12. Much previous work in the area of records management in the Department has been directed principally at adapting the Registry to external physical and related problems and to correcting shortcomings within the organization. To have continued this approach would have tended to focus attention on the attributes of advanced modern technology with the attendant risk of trying to adjust Departmental operations to fit the characteristics of the technology. The introduction of any new equipment would, of course, involve adjustment to some extent. It seemed advisable to try to avoid the difficulties earlier experienced by many public and commercial institutions where enthusiasm for in-house computer units has found eager salesmen ready to supply expensive high-powered packages of equipment which, unfortunately, have often had only marginal application to the actual operations of the organizations concerned.

13. Following presentation of a "Work Plan" to the Electronic Data Processing Committee on October 1, 1974, the project team therefore proceeded with the first task of a thorough survey of the Department's needs. Many of these were immediately identifiable in ordinary operations. In addition, the study focused on several Divisions which were trying to find better ways of carrying out specific assigned programme activities. Thirdly, attention was given to the important sector of senior management and central policy formulation where it was seen that in an increasingly complex environment various special needs would have to be met if the full potential of the Department was to be realized.

14. Once the nature of the principal needs of the Department had been determined it was possible to develop a statement of the objectives to be attained by the information systems of the Department. From these objectives the main characteristics of the systems to be proposed were derived and various options, both for organizational purposes and for equipment, were examined. Out of this was developed the "Preferred System" and some description of its main features. Having reached a number of tentative conclusions, a presentation on the work done so far was made to the Electronic Data Processing Committee on February 17. While a number of questions were raised the general scope of the approach was accepted and the "go ahead" given for the submission of a written report.

15. Owing to several Departmental developments extraneous to the project, somewhat more time has been devoted to Phase I than originally planned. This has permitted more elaborate development of the concepts presented on February 17, some additional work on the financial aspects (precipitated by the FY 1976/77 "B" Budget exercise) and some study of technical and organizational features in the greater depth that would have formed a part of Phase II. This has produced a much clearer picture of what will have to be done in Phase II itself and it can now be seen that this second Phase may well cover some areas originally thought of as belonging to Phase III.

CHAPTER II

THE DEPARTMENTAL SURVEY AND FINDINGS

Nature and Extent of the Survey

16. It was evident from the outset that no simple statement of Departmental requirements would be possible, given the diversity and complexity of Departmental activities. It was also evident that while the use of records services was largely confined to desk officers there were also important needs to be met at higher levels.

17. During most of the period the Under-Secretarial Group was preoccupied with coping with the special difficulties stemming from the absence of the Under-Secretary. Nevertheless, the Assistant Under-Secretary responsible for administration made himself available for a number of consultations and a full meeting, and another Assistant Under-Secretary devoted time to an extended interview. The Central Staff and the Policy Analysis Group also were closely involved in the study.

18. The survey coincided with the country programming process which precluded a meeting of the Directors-General. However, thirty-five Directors General and Directors were interviewed singly or in small groups. At the working level personal interviews were held with some forty-five to fifty desk officers in sessions sometimes extending to as much as two hours. A questionnaire was drawn up to provide some form and consistency for the discussions with desk officers. Annex II is a copy of the questionnaire showing the nature of the subject matter covered in the interviews. Twelve Divisions or sub-units were identified as having special requirements which were examined.

19. The current operations of the Records Management Division itself were of course looked at in some detail, as were those of Communications Division and the Library. Eight posts abroad (three in Brussels) were visited in conjunction with a look at a number of outside institutions having requirements for information storage and retrieval similar to that of External Affairs.

Categories of Information Use and Need

20. It was found that there was no entirely satisfactory way of drawing distinctions among the various activities and users of information in the Department. One useful division is that between so-called "substantive" activities and "housekeeping". The latter term has gained official currency, being employed by Treasury Board for a broad range of administrative, personnel and related functions. An immediate objection can be raised that, particularly at senior managerial levels, substantive and administrative questions can become closely intertwined. This is indeed becoming increasingly demonstrated in the country programming process. Another approach would be to classify uses according to the kind of records or information employed. Thus the consular and personnel "case" files could technically be treated in a similar way and complex political and economic material in another. Available technology and procedures would thus tend to determine how activities would be grouped. The matter of security classification, or absence of it, was another factor to be considered. Also to be taken into account was the fact that in certain areas programmes involving

automation have already been underway for some time (e.g. in the Passport Office, Finance and Personnel).

21. The whole picture could perhaps be most accurately presented by a complex matrix diagram but it was concluded that for the time being it would suffice to group users within three broad categories:

A) Bureaux and units conducting substantive Departmental programmes and generally using the main records system, or those whose special needs should be met from any "core" system which might be developed. This group would encompass nine Bureaux, namely: the four geographic Bureaux; Economic and Scientific Affairs; Coordination; Defence and Arms Control; Legal; United Nations. It would also include: Senior Management; the Central Staff; the Policy Analysis Group; the Press Office; the Policy Information Section in the Information Division.

B) Bureaux or units associated with the substantive programmes but tending to need their own operational or "satellite" information systems in addition to having access to the main records system. Bureaux, divisions or units in this group, some of which are also represented in Category A, either conduct programmes of their own (e.g. Consular) or provide operational support to the principal substantive programmes, (e.g. Protocol or Intelligence and Security). The group would include: the Minister's Office; the Consular Bureau; the Public Affairs Bureau with several different requirements; Federal-Provincial Coordination; Intelligence and Security; the Library and institutional Document Centres (e.g. U.N. and NATO); Protocol; Special Research Bureau; Treaty Section of Legal Bureau; Inter-departmental Committee on External Relations.

C) Units conducting virtually independent programmes or providing administrative support to the substantive programmes of the Department. The group would include: the Personnel, Finance and Administration, and Communications and General Services Bureaux; the Security Services Division; the Inspection Service. Within these Bureaux are units performing functions relating to the planned personnel data bank, an automated overseas allowances system, property and materiel inventories, locally-engaged staff data, manuals maintenance and the authorities index. For convenience the Passport Office (with a computer to be used in the issuance of passports) is included in Category C, although it might logically seem to fall into Category B alongside the Consular Bureau.

This report is only directly concerned with those elements of the Department dealing with substantive matters. Category C is identified for the sake of completeness and because it is anticipated that in later phases of the project

relationships with Category C will have to be taken into account.

General Findings

22. Many of the findings will be intuitively known to the majority of members of the Department, yet may still appear dramatic in their extent and implications.

23. By way of analogy, an impression is conveyed to one standing back to gain perspective that in terms of potential capacity the Department seems to be firing on only six of its eight cylinders. Destinations are usually reached, but response is often somewhat rough, and there is always the threat of not starting. This is not meant to imply that gross inefficiencies exist in the substantive work but rather that the information system is proving to be inadequate to support some of the Departmental mandates and requirements. An unwarranted burden is thus placed upon the major asset of the Department, the foreign service staff. In earlier days, though much was expected of the foreign service group it was also possible to achieve much, the depth, breadth and complexity of Canadian interests to be coped with being far less than today. Much is still expected, but the only additional aids given today's foreign service officer to survive in meeting the complexities of daily problems are photocopying machines and a modern communications network.

24. The latter may be less of a blessing than appears at first sight since it generally speeds up the impingement of substantive problems and increases the demands made upon desk officers. Inevitably the daily round becomes more and more operational, leaving diminishing time for more reflective work to assist in the task of policy formulation of which the operational activities are a manifestation. There is a further disincentive to examining issues in depth. As the information base of subject files increases day by day, to some officers it will appear that a large featureless plain is being created with the only landmarks being within the memory and experience of individual desk officers. With rotation these landmarks tend to be those very close to the near edge of the plain. Only a very inadequate map exists -- the Records Classification Guide -- and for the few who resort to it, there is little to show how it should be oriented.

25. An important mandate recently reaffirmed relates to the coordination role of the Department in the conduct of international relations. The task of coordinating the whole range of Canada/U.S. relations, for example, will require dynamic record-keeping of current and planned activities of concern to many Departments, as well as Provincial authorities. No support or procedures exist at present for carrying out such a task. Examples were cited where statements made by Canadian officials during visits abroad have resulted in some degree of policy embarrassment, or the upsetting of carefully nurtured bilateral relations in specific areas. Similarly, international activities being carried out by two different Departments have been discovered to be at cross-purposes. On occasion lack of timely key information has hampered international negotiations.

26. The foreign affairs initiative remains with the Department but 'competition' from other Departments and government agencies and the provinces is increasing in certain areas as more and more they perceive their programmes and interests acquiring international dimensions. To cope with this problem

will call for the capacity to take a sensitive and responsive approach at the operational level, and to demonstrate the means to deal in depth with policy issues.

27. The conduct of the survey itself appeared to have a beneficial effect in some quarters in generating thought about how individuals will have to respond to changes in established procedures. Hopefully, the survey will have commenced the process of conditioning the membership of the Department to the need to overcome inertia in order to realize the full potential of any future information system.

Work Approach and Attitudes Among Members of the FS Group

28. The study was welcomed by foreign service officers at all levels, both at home and abroad, who almost without exception expressed serious dissatisfaction about current shortcomings. Since the flow and retention of information is of prime importance to them in carrying out their duties they demand consistent, high-quality support in this sector. This is particularly true because of the way substantive issues are handled in the Department. It is quite normal for material generated by desk officers to rise to the highest levels in virtually original form. The more senior officers bring not necessarily more detailed knowledge to bear on the material but a more experienced view from a vantage point also giving a wider horizon. In large measure, reliance is placed upon the general professional capabilities of the experienced officers and the detailed leg-work of the junior officers. While this usually works owing to the competence of personnel, the weakness of the Registry could some day soon cause an incident of serious embarrassment to the Department. This weakness results from a combination of rotational service and the poor identification of material stored in Departmental files. Although the formal institutional memory in the shape of files goes back many decades, the quality of subject identification varies so much as to be very unreliable for retrieval. The informal memory of the Department which resides in the heads of the FS Group is, in some ways, much better but suffers from its own form of unreliability. For example, the officer who dealt with a similar or relevant situation to one at issue, or who was present at the beginning of a problem may literally be at the end of the world, may no longer be in the service, may be forgotten, or simply ignored. In this way important facts or documents can be and are overlooked instead of making their contribution to a good solution.

29. Although these facts are recognized and lamented, operational pressures frequently preclude the expenditure of time necessary to await an effective response from the Registry, or to carry out an extensive browse through many volumes of files. In the absence of any certainty of finding all the relevant material officers often feel discouraged from embarking on such effort and, if the right material cannot be found, information regarding the identity and current whereabouts of the previous desk officer for consultation is not easily come by.

30. As would be expected, as each successively higher level in the Department is examined, the frequency of use of subject files is found to diminish. Working material tends more to be the 'product' (e.g. memoranda to Minister/ Cabinet, policy statements, briefing books, etc.) in various stages of completion,

or key documents related to particular policy issues or operational problems.

The Desk Officer Group

31. The three most important aspects of desk jobs appear by consensus to be; coordination of Canadian activities in the designated area of responsibility; liaison with posts (with some post management, e.g. Country Programming in the Geographic Bureaux); and policy formulation.

32. The normal pace of events causes the first two to dominate while the time for the reflection and analysis necessary to policy formulation tends to be squeezed to a minimum. The thrust of the desk job is usually operational which leads some to suppress the desire for more reflective/analytic work. Unfortunately, analytic work that is carried out is hindered by the difficulties experienced through filing problems such as slow retrieval response time, "basket" filing which results in large volumes of unwanted, irrelevant material obscuring the few desired items, and poor classification decisions resulting in individual items or whole subjects being incorrectly filed. This situation discourages the desk officer from making any more than minimum use of the Registry, thus widening the gap between him and the analyst looking after his area of responsibility. Furthermore, the Classification Guide becomes less well used and is surprisingly unknown to large sections of the Department. Few officers considered that training in filing techniques and registry facilities was adequate, and many admit that their knowledge of the Registry and its services is practically non-existent. This is another factor in the very low utilization of Departmental files.

33. On the other hand, in spite of lack of training in filing, classification, etc., nearly all desk officers in defence against the adverse environment have developed highly operational sets of working files. These vary from well organized, comprehensive files to very informal 'project' files consisting of selected key documents, with no pretense at comprehensiveness. While no doubt providing a valuable working tool, these files are nonetheless highly personalized and generally not usable by successors unless reorganized. Although the percentage of time spent organizing and maintaining these files is not too great it is time lost to other more productive work. The working files tend to reach back one to one-and-a-half years, which is what one would expect when average assignments in Ottawa are from two to three years. Unfortunately, when related to the fact that relatively little use is made of the Registry files, it becomes evident that an alarming trend is developing, such that problem solutions tend to be based on a reducing time depth, and in some cases only off the 'top of the head' and the latest telegram. While this is understandable, given the support deficiencies and rotational service, and in some cases is valid for the particular situation, the danger does exist that this approach could become the norm for all problems, particularly for younger officers who will have known no other method. This tendency towards a lack of operational historical perspective was further shown in the survey by the most important information sources identified by desk officers. Along with working files were cited telegrams, newspapers and colleagues, all very current sources, the Registry usually being ranked as lying between a very poor third to sixth source. This was highlighted even more by reported differences in average use for working files, four to six times per day as opposed to four to six times per month for the Registry. Operational imperatives will

always demand a heavy reliance upon current information, but the difference in use between working files and Registry files should be drastically reduced, since there should be no real difference in currency of material available from these two sources.

34. The one common time when desk officers turn to the Registry is at the beginning of a new desk appointment. Files may then be drawn from the Registry for browsing purposes in order to obtain the flavour of all the relevant subject matter. Nevertheless, reading the previous desk officer's diary copies was ranked as the more important orientation activity. Perhaps that is as it should be, but there were many complaints about the difficulty at this stage for the desk officer to obtain a more structured picture of policy statements, key documents and principal high-point events and activities from the background material of his new subject area.

35. In this question of ease of access and presentation of material, there has arisen an almost paradoxical situation. Many officers feel that too much information material passes over their desks. On the other hand, it is this stream of material which builds the general awareness of foreign affairs professionally required of the foreign service officer, and alerts him to a situation which may have relevance or implications in his own area of responsibility. Though essential, the sheer volume of paper is daunting. A Departmental information system which provides solutions for the other problems discussed should also form the basis for an eventual better control of the mass of material.

Management and Staff Roles

36. As one moves up through the staff to the management levels in the Department the same problems are still found which so exercise the desk officer group, but there is a change in emphasis. The implications and effects of decisions, and the professional experience of senior officers added to the detailed work carried out by desk officers, usually bring about satisfactory results in spite of the many impediments. The sum total of the thousands of decisions, events and activities with which the Department is engaged constitutes the expression of Canadian foreign policy. Departmental management recognizes that a major purpose is to direct this mass of activity so as to give effective support to the political position and philosophical attitude of the Government of the day. The multiplying Canadian interests abroad make this task increasingly difficult in two ways. Firstly, the very mass of information makes familiarity and selection more difficult and less encompassing. Secondly, analysis of the information is rendered difficult, since no adequate tools exist to support the effort required to identify, select and manipulate all relevant facts having a bearing on the situation. The formation of the Policy Analysis Group (PAG) reflects a recognition by management that such analysis is required, and the Country Programming exercise achieves a conjunction of policy objectives with the overall direction and effort expended in the conduct of Canada's foreign affairs.

37. Discussions with senior officers did result in some needs and desires being expressed in terms of possible solutions. For example, the possibility of selection of information and display for both individual and group use was discussed, with particular reference to telegrams. The need for data sets of key documents, already identified by desk officers, was given greater emphasis at more senior levels.

38. Another important need identified was that of country data banks, both as a general proposition and to meet needs in particular areas, such as Canada/U.S. relations. Without positive information support the coordination role was seen as being difficult to develop effectively. The possible establishment of data banks holds promise of substantial benefits for various sectors of the Department and was explored in some depth with the Policy Analysis Group and the United States Division.

Working Files

39. Of the fifty or so desk officers interviewed in the study only two relied exclusively on Registry files. These officers made positive decisions to make their association with the Registry work and appear to be succeeding fairly well but the question must be raised whether the Registry, as at present constituted, would have the capacity to serve all officers equally well if all made similar demands on the system.

40. The normal situation is for desk officers to rely heavily upon their working files, as can be seen from some of the responses to a questionnaire used in the summary:

* working files were thought sufficient to satisfy day-to-day needs in sixty to ninety per cent of the cases;

* usually one to two drawers full of working files are maintained, with the occasional officer maintaining in excess of one filing cabinet;

* organization is generally by subject, as is that of the Registry, but the subjects are at the sub-file level in order to satisfy operational needs;

* selection of material for these files varies from strict criteria such as immediate operational use, key papers and policy statements to almost no criteria resulting in files resembling the Registry counterpart in volume;

* some attempt is generally made to weed out and perhaps reorganize the predecessor's working files, although frequently they are regarded as being geared too much to another person's foibles to be of much continuing use;

* desk officers expect to inherit some files from their predecessor but usually wish to see only current material plus important background on policy papers;

* in more than seventy-five per cent of the cases requiring information (from any source) the desk officer goes back less than one year in his search. (N.B. average depth of working file - one-and-a-half years);

* working files generally rank higher than Registry files as a source of information;

* working files are referred to four to six times per day, compared to approximately once per week for the Registry;

* in reaction to specific events/subjects requiring information the desk officer usually turns to his working files as a first and possibly final source;

* quality of working files varies considerably, depending on the working style of the officer concerned;

* on a regular basis only a relatively small amount of time is devoted to maintenance of the working files, but every few months an afternoon or evening is devoted to weeding and re-organizing as required.

It can be seen from this that working files have now become a way of life in the Department. A case can be made for a certain degree of use of working files but very heavy dependence is a form of sub-optimisation which, because of lack of any quality control and difficulty in maintaining continuity across rotational changes, can seriously undermine the efficiency of the Department. Furthermore, there is a duplication of effort in parallelling Registry functions and mis-application of time and energy by desk officers who have other functions to perform. They also not infrequently commit the sin of placing original documents in their own files, which are then thrown out by their successors. Finally, this do-it-yourself process increases the gap between the user and the Registry, thus diminishing any effective support which could be offered.

41. During discussions with desk officers no attitude either for or against was adopted by team members, but it was frequently apparent that a degree of embarrassment existed regarding the extent of dependence on working files, a practice well understood to be against standard Registry practice. This, added to the fact that the maintenance of working files is a burden, suggests that the desk officer is not irreversibly wedded to this mode of operation. Presented with a better alternative fulfilling his needs he would rapidly reduce this dependence. A general aim of this project is to provide better records management service rather than to wage ideological warfare on the working files, but in achieving the main objectives the secondary enemy stronghold would also be reduced.

Needs in the Posts

42. In the eight posts visited it was quickly obvious that a system developed for Ottawa would not directly benefit the posts very much and might in fact demand more from them, with little or no apparent benefits. The demands could take the form of possible improvements or changes in the format of telegrams to facilitate indexing and rapid comprehension by addressees. This was generally felt to be acceptable, if not necessary, although misgivings were expressed about backsliding from improvements to former ways. Since all officers at posts have served in both Ottawa and abroad, both sides of the problem could be seen and appreciated.

43. On the other hand, by direct observation, and from information provided by the Records Management Division, registry operations in some posts were found to be below par. Efficiency and effectiveness of these registries rests almost entirely on the capability and initiative of the registry supervisor. Much more guidance and control should be exercised from the Ottawa end

to improve the general quality and would be welcome. There were indications that CR's posted abroad do not relish registry assignments as compared to other tasks. This attitude naturally affects their work and may be a reflection of inadequate conditioning and training before departure from Ottawa.

44. A valid complaint, and one which to some extent echoed Ottawa-based officers, is that not enough selected key or policy information reaches the posts. This situation will be alleviated to some extent as the Selected Documents series is stepped up in production, and would further benefit as the important material in the Department is identified and made accessible to users through general improvement of the information system. Some officers abroad enquired about the use of microfiche and video tape techniques and country data banks.

The Records Management Division

45. Annex III contains detailed information on the structure and procedures of the Records Management Division as at present constituted. What follows is a view of the Division largely taken from the perspective of Departmental users.

46. Throughout the years and in a number of studies it has been recognized that the Department is dependent on its substantive files, and that the Division charged with managing them should be provided with the requisite people, skills and procedures to carry out this task effectively. In practice, however, the Records Management Division has tended to be relegated to low priority levels for both resources and skills.

47. A recital of historical problems in this area would serve little useful purpose, but it is instructive to cast back to the period just prior to and after the move to the L.B. Pearson Building. When the Department occupied a number of buildings sub-registries were a necessity. Access to files was psychologically easier because of physical proximity in most cases (although less so after some consolidation within buildings) and thus the phenomenon of working files, while still present, was not so pervasive or well developed as it is today. Many of the complaints regarding the contents, filing and organization of the material one hears today were also being voiced at that time.

48. The move to a new building in which special facilities would be provided was generally expected to result in a much improved service. Experience has unfortunately proven otherwise. In some measure the problems can be and were ascribed to failures in the mechanical equipment features of the new system. For instance, frequent breakdowns of the Randtriever caused large backlogs in the placing of items in their subject files and long delays in retrieval since the automatic mechanism used to pull files from the storage shelves was inoperable. Compounding this problem was the almost daily stoppage in the conveyor system due to box-jams. Since desk officers could not rely upon the system their dependence upon and the scope of working files grew considerably. It is an axiom of systems' use that, having failed the user a number of times, it is extremely difficult to regain his confidence; this is evident in the current system even though there has been a reduction in most equipment faults. A danger exists that the visible difficulties, which apparently explain so many of the recent operational problems, could in fact obscure some of the more important elements which condition the possibility of success or failure for the whole process. It is revealing, therefore, to compare some key factors in the Registry function with some other information-handling groups in the Department, and with the Department as a whole. Salient features of the comparisons are shown in Figure I, while Figure 2 gives some indication of the scale of operations in the Records Management Division.

FIGURE I

Comparative Departmental Data

Note: Except for Departmental Budget, all figures are for Headquarters operations.

	1967	% of Total	1970	% of Total	1974	% of Total
Budget						
Departmental	$ 17.0 MM		$ 34.5 MM		$ 112.3 MM	
Records Management Div.					$ 1.0 MM	0.9%
Telecommunications Div.					$ 6.0 MM	5.3%
Library					$ 0.6 MM	0.5%
Staff - Strength						
Department	1,361		2,005		2,854	
F.S. Officers	442		510		751	
Records Management Div.						
- Registry Staff	68	5.0%	61	3.0%	70	2.5%
- Messengers and Mail Room	25		25		50	
Telecommunications Div.					207	7.3%
Library					23	0.8%
Space (sq. ft.)						
Department					512,000	
Records Management					33,000 (incl. conveyor rooms)	6.4%
Telecommunications					23,000	4.5%
Library					25,000	4.9%
Equipment (Major)						
Records Management					$ 0.7 MM	
Telecommunications					$ 3.0 MM (Estimated)	
Workload						
Papers filed	300,000		400,000		730,000	

MM: Million

FIGURE 2

Present Records Management System

Man-years in Registry Operations	80	(Excluding Messengers)
Annual Budget	$ 1,000,000	Salaries $ 900,000 Operating Expenses $ 100,000
Specialized Capital Equipment	$ 750,000	
No. of Items Handled	750,000/yr.	(305,000 substantive)
Retrieval Activity	270/day	Substantive 70/day Administrative 200/day
No. of Substantive Files	137,000	Current 24,000 Dormant 13,000 Archival 100,000
Space	33,000 sq.ft.	A Tower 18,000 sq.ft. C Tower 3,000 sq.ft. Conveyor rooms 12,000 sq.ft.

49. A highly significant fact emerges from Figure I, related to the man-years allocated to the Registry. Excluding Mail Room activities (where man-year transfers between Communications and Registry have taken place in both directions) to obtain comparable data over time, the man-year allocation for the Registry has remained almost static over the last fifteen years when compared to the FS and the Communications groups, both of which have more than doubled in number. Since both of these groups directly affect the workload in the Registry (better communications encouraging more material from the larger FS group) it is not surprising to learn that the number of papers processed in the Registry over the same period has more than doubled. This could be construed solely as an increase in productivity but, examined more closely, it can be seen to involve also a large decline in quality. Continuation of this trend would result in Records Management resources being applied essentially for archival purposes, and a hidden cost which exists now would greatly increase as working files became the major and perhaps virtually only source of reference for the desk officer.

50. A closely-related problem to the number of man-years allocated to registry work is that of the level of competence. There are two dimensions to this, the one being the classification levels associated with specific tasks and the other being the kind of people passing through the Registry in the operation of the pool of rotational CR's. Every previous study has dwelt at length on this subject, but little can be seen in the way of improvement. Time and again desk officers commented on the adverse effects of rotation, both as to the lack of experience on the part of classifier/analysts resulting from short assignments and the quality of those assigned to this function.

51. With this background, the problems and difficulties experienced by users of the Registry can be understood in general terms. First among the problems was that of inaccurate classification of material but if any radical improvement is to be achieved it is useful to examine the major shortcomings in some detail. This reveals itself in a variety of ways, each of which brings its own type of frustration to the user:

a) "basket" filing: if pressed for time or uncertain about the content of an item, there is a tendency on the part of the classifier to designate the "General" file. This results in a diverse mass of issues interwoven in a single file; one example among a great many is File No. 38-4 -- "Asian Development Bank" which now has grown to over forty volumes in about ten years. Inordinate amounts of time are required of a user to select the specific thread he needs from the basket.

b) inaccurate classification: here the problem is one of misinterpretation of the prime purpose or subject of the item being analysed, often leading it to be filed under a peripheral file title so that it is missed completely when the subject is being studied later.

c) cross-filing: closely associated with inaccurate classification is the lack of adequate cross-filing. Thoughtful cross-filing can overcome errors in main subject designation and assist retrieval. Good judgment is needed here to avoid

the "basket" file containing many irrelevant items.

d) sub-files: a fairly common phenomenon known to professional indexers is "subject drift" which arises in general material not amenable to "case" or "project" filing. A good analyst will recognize this fact and create a new sub-file devoted to the new topic. Too often the change passes unnoticed, with the "basket" file result. More commonly the analyst fails to see clearly the various subsidiary subjects under a general heading, or is lazy, and allows the massive "basket" file to develop. Allied to this is the question of the sensitivity of the filing system to the user's needs. General lack of liaison and understanding between the registry analyst and the user results in delays or refusals to create sub-files as requested, in some cases with justification. However, this lack of flexibility turns the user back to his own files which can be arranged to suit the immediate situation as he sees it and tend to be very project-oriented. While it would be wrong for the Registry to attempt to match this very short-range flexibility, too rigid a structure does not serve the users well.

52. An attempt at corrective action in the recent past in the area of subject classification has been the institution of a key word index serving a twofold purpose, namely, to provide a method of assisting the user to gain access to specific items, and to provide the Registry analyst with a similar facility to assist in relating new material to relevant previously filed items. It was anticipated that the procedure, which generates more than 250,000 index sheets per year, would be a preparatory step to computer indexing. However, the quality of selection of key words and other aspects of the situation are such that grave doubts are cast upon the validity of the exercise, in spite of the some one-hundred requests per day addressed to the index, mostly by the analysts.

53. The fundamental weaknesses with respect to the classification of material are compounded by a number of other shortcomings which are usually the first problems to become apparent to the potential user. Among these are:

* slow response to retrieval requests

* apparent two-week delay before material is 'put away' into files

* material not yet 'put away' is frequently omitted when files sent to users

* Registry is usually unable to respond on the same day to requests made after 3:30 p.m.

54. It has been shown how rotation affects the quality of staff performing analysis of material in the Registry. The other critical problem it creates is a lack of continuity both in historical knowledge of material and understanding of the needs of individual users, who themselves change on a rotational basis. Given all the various problems the low average figure of forty-five substantive file retrievals per day (exclusive of Consular and "housekeeping") is not at all surprising. It seems almost inevitable that as the deficiencies mentioned above

go unchecked, there being few corrective actions applied by the users, and as usage drops off relatively, the Registry files could become almost meaningless to the substantive operations of the Department, existing largely as a jumbled warehouse of archival material.

Summary of General Findings

55. During the many interviews and discussions held on the subject of information storage and retrieval four principal needs were expressed by a large cross-section of the participants which can be summarized as follows:

a) fast response to retrieval requests: heavy operational biases, the need to offer guidance and suggestions to the posts, general work habits and a much improved communications system all conspire to reduce the time span acceptable to participants in the foreign affairs process.

b) much more skilful and flexible employment of the Records Classification Guide: To compete with the users' own working files, the Departmental files must more closely parallel the operational demands of the Department.

c) better access to key material: to ensure a sufficient depth of background is brought to bear on a situation, to facilitate the maintenance of a comprehensive overview at senior management levels, to provide a basis for policy analysis at the macro level.

d) coordination support: up-to-date structure of information to provide better means to identify events, activities or policies of relevance both inside and outside the Department.

The "Satellite" Systems

56. Paragraph 21 identified Category B as a group of "users" whose programmes included activities largely of an operational nature which seemed to give rise to rather specialized requirements. It would be premature to decide whether these requirements would best be dealt with by traditional methods or by applying automation, or by some combination of the two approaches. The various activities will have to be examined in more detail in Phase II but it would seem desirable to cite them briefly now on the basis that at first sight there would appear to be possibilities to make gains in the quality or productivity of present operations by the application of more advanced techniques. The following listing is not exhaustive but will serve to record by unit or Division a number of perceived requirements revealed in the course of the Departmental survey:

a) Consular Bureau

(i) With the assistance of the O and M Section of the Management Services Division the Bureau has determined that there is a pressing need to create a consolidated name index of Canadians requiring consular assistance abroad or otherwise becoming the subject of concern to the Bureau.

(ii) There is also interest in the Bureau in developing

quick access to policy and case precedents in order to promote greater consistency in consular operations, and greater speed in dealing with difficult cases.

b) Protocol Division

(i) A data bank, continuously up-dated on all foreign representatives in Canada (diplomatic, consular, trade, etc.) and their dependents and employees. This data bank should contain all relevant personal information and contain all data on the status of individuals, and dates of accreditation, etc.

(ii) A set of policy and case precedent data on certain categories of protocol activities.

(iii) VIP visits to Canada and Canadian visits abroad. The storing and quick retrieval of certain basic information would greatly assist this area of Protocol activity.

(iv) International conferences - This is a subject under current study both in the Division and, from a different point of view, in the Central Staff. The latter aspect is dealt with in paragraph 114. The precise requirements should emerge shortly.

c) Bureau of Security and Intelligence Liaison

This Bureau has two specialized sub-registries which should be further examined to determine whether any developments to be introduced elsewhere in the Department could be applied to advantage.

d) Special Research Bureau

Has its own sub-registry with regard to which comments for (c) above also apply.

e) Legal Advisory Division

(i) Treaty Section: The Canada Treaty Series and related material are now handled by a manual system which could well render better service through automation.

(ii) The Division is interested in further development of its special case and precedent filing system.

f) International Institutional Documentation

The volume grows year by year and new ways of storage and dissemination should be devised to cope with this material while maintaining a high level of accessibility.

g) Public Affairs Bureau

There is a need to build up a quick access data bank on key individuals as "resources" for implementation

of the expanding cultural relations programme.

h) Federal-Provincial Relations

The Division is working on an outline of its special needs which will be taken up in Phase II.

i) Interdepartmental Committee on External Relations (ICER)

The Country Programme exercise coincided with the Departmental survey. It is already clear that the development of country data banks as discussed in paragraphs 106 to 109, and other Level III and IV activities, will be very pertinent to country programming. It is proposed to explore further the potential of automation processes with the ICER Secretariat in Phase II.

The "Independent" Systems

57. For the purpose of discussing the independent "users", Category C identified in paragraph 21, a practical approach is to make use of the definition of non-substantive employed in the annual electronic data processing report submitted to the Treasury Board in November, 1974. This read as follows:

" b) ..... those projects that administratively support the Department in the formulation or carrying out of Canadian foreign policy, in such areas as finance, personnel, telecommunications or the passport office. The data used in these projects is referred to as "non-substantive" because it has no direct bearing on the formulation or carrying out of Canadian foreign policy."

58. Within the area covered by this definition a number of automated processes are already in use, are under development or are being considered. The principal areas of interest in this respect are:

a) Message Switch

b) Passport Office

c) Payroll

d) Departmental and post accounts

e) Automated cataloguing in the Library

f) Data bank for Canada-based personnel

g) Control of personnel allowances under the Foreign Service Directives

h) Data bank for locally-engaged staff abroad

i) Materiel and property management inventories

59. It is not proposed that the present project should disturb or otherwise affect these independent systems. However, it seems advisable to

take note of them. It is conceivable that under certain circumstances computer capacity provided to operate the "core" system for the substantive work of the Department might be available on a sort of time-sharing basis to carry out tasks in the non-substantive sector which would otherwise have to be paid for on commercial terms. The general rule would have to apply that there should be absolutely no degradation of the service to the designated principal user of automated equipment, but that within this constraint the possibility of complementary operations should be explored where suggested by analysis of the cost/benefits and concurred in by the appropriate central agencies.

60. In citing functions which are or might be candidates for the application of automation techniques the point should be made that in the Minister's Office, and within the personnel and related fields, there are a number of sensitive areas where traditional registry methods would have to be retained. It must also be appreciated that at the higher levels of activity in the Department the line separating substantive from so-called "housekeeping" matters becomes quite indistinct. In particular the country programming process obviously cuts across both the substantive and non-substantive activities of the Department. This aspect will have to be examined further in Phase II to ensure sufficient flexibility in the system to cope with any operational difficulties which might arise. Not to be overlooked in this connection would be the need to establish reliable procedures at the entry of the system to deal with "To be opened by addressee only" and similar material.

CHAPTER III

SYSTEM CRITERIA AND SURVEY CONCLUSIONS

System Criteria

61. The broad survey of the Department gave rise to a number of tentative ideas about the possible shape of an improvement programme, some of them seemingly not entirely compatible with others within the constraints of the state of the art and realistic resource expectations. As a first step, therefore, it was decided to attempt a statement of the various criteria which the future system should be required to satisfy. This statement is set out below:

General

a) To provide economic safekeeping of departmental records and related data in accordance with Treasury Board policy and directives.

b) To ensure timely delivery of material to addressees.

c) To organize and store material in a manner to ensure access to specified items on request.

d) To meet archival requirements for retirement of material from active records.

e) To provide for the orderly economic development of the overall system to accommodate both future Departmental needs and changes in the state of the art.

Of Significantly Greater Importance to External Affairs Than to Other Departments

f) To meet Government requirements for controlled access to official material by non-official users.

g) To operate in accordance with Canadian and other security requirements.

h) To accommodate an unusually wide range of complex material as well as complicated relationships.

i) To provide for a flexible classification system to meet changes in the subject matter handled in the Department.

j) To meet the operational requirements of bilingualism.

Largely Specific to External Affairs

k) To compensate for the lack of continuity inherent in a rotational service.

l) To serve the varied operational requirements arising from the posts abroad.

m) To support the Department's coordination role by maintaining up-to-date data bases to ensure the timely flow of relevant information to other Government departments.

n) To support particular Departmental operational functions through quickly accessible data bases.

o) To provide for the timely presentation of key information

: in general support of the foreign policy formulation role;

: as a tool for senior management to ensure proper correlation in the policy formulation process.

62. The statement of course contains the obvious criteria which would be expected to apply to any records management system. It will be seen to reflect also a concern about the various shortcomings revealed by the Departmental survey. Thus, under the "General" heading, items (b) and (c) reflect a concern for poor registry performance in addition to being of the general character shared with the other items within the same category.

63. Some additional comments may be useful:

Item (a) may seem so obvious as not to require stating, but if it is appreciated that the Department has some 30,000 files in the Lester B. Pearson Building, and about another 100,000 in the Public Archives at Tunney's Pasture occupying expensive storage space, the significance of the word "economic" becomes apparent. There is also the problem that some important original documents of historical value have been irretrievably lost. Treasury Board must, of course, give specific approval of any new programme involving the significant use of electronic data processing.

Item (b) is partially the product of complaints about slow deliveries from the Registry. At the same time it is meant to ensure that any innovations introduced to the system, such as computer indexing or microfilming, do not impede the rapid movement of material from the Communications Centre or Mail Room to addressees.

Item (c) is addressed to current weaknesses in the classifying and indexing processes but is also a warning that expenditure for automation will only be justified if accuracy and speed of retrieval is improved without swamping the user with a mass of unwanted and superfluous documents.

Item (d) reflects the fact that there seems to be greater archival interest in documents on Canada's external relations than in the history of the operational programmes of many other Departments. Moreover, at a rate of five-hundred retrievals per month External

Affairs has occasion to call for old records from Tunney's Pasture relatively more frequently than do most Departments. Only CMHC, DSS and DVA with searches for "case" and financial records match the External Affairs rate. The National Archives must also concur in any records microfilming programme introduced in the Department.

Item (e) recognizes that whatever system may be developed it must be such as to accommodate to continuing changes in Departmental needs as the Department itself adapts to changing world conditions. Adoption of a new system, but one giving only limited scope for response to change, could only lead to a second, probably painful, readjustment if it should later be found to have outlived its usefulness. Similarly, deliberate care must be taken to avoid being locked in on a technological "dead-end" when reasonable planning could take into account possible evolution in the state of the art.

64. Five criteria, while undoubtedly of significance to all systems, are identified as appearing to be of greater importance to External Affairs than to other departments:

Item (f) is a reflection of Government policy, as announced by the Prime Minister in the House of Commons on May 1, 1969, to permit access to Departmental files covering the so-called "closed period" (i.e. records less than thirty years old) by legitimate academic researchers. As indicated with respect to archival requirements there is a relatively high level of interest in External Affairs material. Because the files inevitably contain some sensitive documents regarding living persons or relating to foreign governments, some degree of control over access is essential. If the technical structure of the information system should be such as to call for random or indiscriminate searches through the whole body of material including current documents, outsiders could not themselves be given direct access. The servicing of legitimate enquiries could thus impose an undue burden on the personnel and other resources of the Historical Research Division.

Item (g) will be of particular relevance if computer indexing and retrieval procedures should be introduced. "Need for access" rules would obviously have to be adopted and the question of physical security also arises in that a computer will require shielding to prevent outside detection of electro-magnetic emanations. Rules and procedures regarding EDP installations have been established under the Interdepartmental Security Advisory Committee.

Item (h) recognizes that the complex nature of the operational files of the Department places unusual demands on the records management personnel and on the system itself. Most subjects involve several inter-relationships, thus differing in this respect from the much more common "case", "name", "project" or "place" files which can be coped with reasonably well in many other departments.

Item (i) on the face of it could be said to deal with a problem common to other systems. In practice the frequent new developments on the international scene, and Canadian responses to them, link this problem to that discussed immediately above.

Item (j) reflects the fact that both official Canadian languages are being freely employed in communications throughout the Department. This will impose operational requirements on the system both as to personnel dispositions and automation techniques.

65. Finally, several of the criteria will be seen to be largely specific to External Affairs.

Item (k) relates to a problem which touches most aspects of Departmental operations. Because of foreign service rotation the depth of the "institutional memory" in the various divisions is much shallower than in other departments which much weakens the exercise of the Departmental coordination role in the conduct of international relations. This weakness has been compounded by the fact of the rotation of classifiers in the Registry. Development of the system must therefore be specifically directed towards compensating for these drawbacks.

Item (l) calls for the headquarters system to be compatible with and to support the substantive programmes, and the communications and registry operations at some 113 posts in foreign countries. Any new format for communications, for example, must not impose unreasonable strain on the personnel and other resources at the posts. The pool of rotational CR's and their training must also be taken into account.

Item (m) is directed towards the creation of "country" and other data bases to make possible the systematic presentation of relevant information to other government departments in order to support the Department's coordination role. This is a function which can only be performed inadequately at the present time.

Item (n) identifies the need for the creation of certain specialized data bases to facilitate a number of functions within the Department (e.g. the "satellite" systems described in paragraph 56 for Protocol, Consular and other operational activities).

Item (o) envisages the extension of the information system to a new dimension to encompass the particular needs of the senior management and central policy formulation sectors. In these areas there is a generally perceived need for new tools to cope more expeditiously with policy issues and the related question of crisis management.

General Conclusions

66. The Departmental survey resulted in confirmation, if any were needed, that the initiation of the project (and the FY 1975/76 "B" Budget forecast for additional resources) had been fully justified. The records management sector had been starved of manpower and other resources over a period of many years when all Departmental activities had been undergoing continuing rapid expansion. As a result the system had not itself been able to generate solutions to its many problems. It was abundantly evident that to correct this situation substantial changes would have to be made and that these should be carried out through a coherent overall plan. It was also clear that the planning should be based on dynamic rather than static concepts. Any major changes made at the outset should be such as to accommodate future organizational and technological developments as well as the continuously evolving Departmental requirements. Failure to take these factors into account could lead to the need for later corrective measures involving economic losses and serious disruption of Departmental operations. To achieve optimum development over time, the new system should be designed to promote a close and constant interactive relationship with the substantive and policy formulation sectors of the Department.

67. In only a somewhat narrower perspective three important general conclusions have emerged which, if accepted as valid, will tend to shape almost everything else that might be done in the way of information systems development. They may be briefly stated as follows:

a) Information Control Offices should be established in each Bureau.

b) The present Records Classification Guide should be retained to support a modified subject file system.

c) Modern automation and related techniques should be introduced to support the higher-level policy formulation and coordination functions.

68. a) Bureau Information Control Offices:

There was an almost unanimous consensus at all levels that the removal of the Sub-Registries from the Bureaux which had accompanied the move to the new building had led to a deterioration in service. While there have been other contributing causes there was much evidence to support the general view that the absence of face-to-face contact with the classifier/analysts had negative effects on both the desk officer and the Registry. If the Bureau Information Control Office is accepted as a concept, then its general shape and function should become much as described in paragraphs 84 to 91. From the point of view of the organization of the system as a whole, the important aspect to consider here is the shift of the analysis, indexing and retrieval processes from the Central Registry to the Bureau Site. Such a change would be feasible in a manual system, with some strain, but the introduction of a computer would eliminate the difficulties related to the physical flow of material. More importantly, the computer would bring a number of benefits by enhancing the

capacity of the Information Control Officer to serve his Bureau in ways beyond the range of ordinary registry practice. While such decentralization would bring substantial advantages it would also require a tightening up of procedures which in itself would improve the system: the movement of papers would have to be carefully controlled because indexing and analysis would be dispersed to locations remote from the point of entry to the system; the indexing procedure would have to accommodate to several points of entry (e.g. Mail Room, Comcentre, internal); to avoid heavy traffic through the conveyor system, current "hard copy" files would probably have to be placed in the Bureau Information Control Offices; multiple copying of microfilm of Departmental files would probably have to become an important feature of the system.

69. b) The Records Classification Guide

An issue presented from the outset was whether to abandon subject files in favour of random sequential storage, with material being retrieved and made up into files upon requests made by users. It was seen as theoretically possible to link the power of a computer with sophisticated indexing and retrieval techniques to produce the desired results. In effect the computer could record and present the location of every communication, whether it were to be found in a roll of microfilm, in a video tape or in a traditional "hard copy" subject file. Once located, copies would be made of the required documents and the collection sent to the user. This is the approach being taken in the U.S. State Department for telegraphic material but "hard copy" files continue to be maintained in the various Bureaux for up to three years. It was concluded that some serious risks were involved in opting initially for random storage of material. That there are practical difficulties has recently been confirmed in word from the State Department that the reconstitution of files has turned out to be both a slow and costly process. The idea of a working officer calling for the drawing together and building of a file to suit his immediate perception of a subject, or as a means to manipulate a certain slice of information taken from a mass of related material, while having certain attractions, turns out to be a somewhat theoretical approach in the light of actual needs and practices in the Department. Properly used, the present Records Classification Guide should produce appropriate collections of material and proper indexing should enable the retrieval of specific items. The idea of constituting files as needed for some specific approach appears to stem from the concept that the conduct of foreign affairs involves appreciation of the simultaneous existence of many complex inter-relationships. There is indeed a matrix of relationships in the conduct of Canadian international relations but it is well provided for in the very structure of the Department itself. For example, the Geographic Bureaux intersect with the horizontal global concerns of the various functional Bureaux ranging across such diverse subjects as Economic policy, United Nations affairs and federal-provincial relations. It was concluded that in by far the majority of cases the needs of desk officers could best be met by proper and enlightened use of the Records Classification Guide. With computer indexing providing "addresses" for papers in subject files, it should be no more difficult to constitute special collections of papers from them than from random storage. Furthermore, the value and utilization of subject files could be much enhanced by the dynamic use of microfiche technology. The retention of the Records Classification Guide would of course leave undisturbed the operation of post registries.

70. c) Policy Formulation and Coordination

In paragraph 21 it was found useful to present the Departmental programmes as embracing three categories of users. These were identified as the substantive users of the "core" information system, those associated with the substantive programmes but tending also to have needs for "satellite" information systems and, thirdly, those providing administrative support or conducting virtually independent programmes. For the purpose of further analysis it is now appropriate to look at the Departmental needs in a different way. Figure 3 portrays in simplified form a series of levels of activity, and of use of information in the Department, starting with immediate operational needs at Level I and progressing to macro policy analysis and related functions at Level IV.

71. The purpose is to show that the present Records Management Division is only functioning at Levels I and II (and at that none too well). It is in fact unfair to demand much more of a traditional registry organization or of one employing a degree of mechanization but based on essentially manual procedures and "hard copy". This leads to the conclusion that a full-fledged information system should be developed to incorporate the capabilities of modern technology to provide the necessary depth of support required for effective performance of Level III and IV activities. The introduction of a computer to expedite the operation of the Bureau Information Control Offices would provide Levels III and IV with both the means of a direct link with the main flow of Departmental information and a flexible and powerful tool for direct application to the coordination and policy formulation roles.

72. It was earlier stated that the three main conclusions just described in a general way would have an overriding influence on the evolution of the Departmental system. If they are indeed accepted as valid then several further conclusions can be drawn from them in the light of the system criteria set forth in paragraph 61 and which to some extent have already been implied. Briefly, these are:

a) Given the importance of the Bureau Information Control Offices to the system as a whole, and the range and complexity of the work, the Information Control Officers in charge of them would have to be appointed at least at the semi-professional level, and they would have to be non-rotational. Anything short of this would tend to jeopardize the implementation of the new system.

b) A computer should be used as the principal tool in the indexing and retrieval process.

c) Micrographic or videographic storage techniques should be adopted for the closed "core" files (at this stage of the study micrographic storage seems preferable) and current files should be held in the Bureau Information Control offices.

d) The computer and related equipment (such as CRT's and microfiche or video) should be exploited to support Level III and IV activities.

TOTAL DEPARTMENTAL REQUIREMENTS

PRESENT SYSTEM

PROPOSED AUGMENTATION

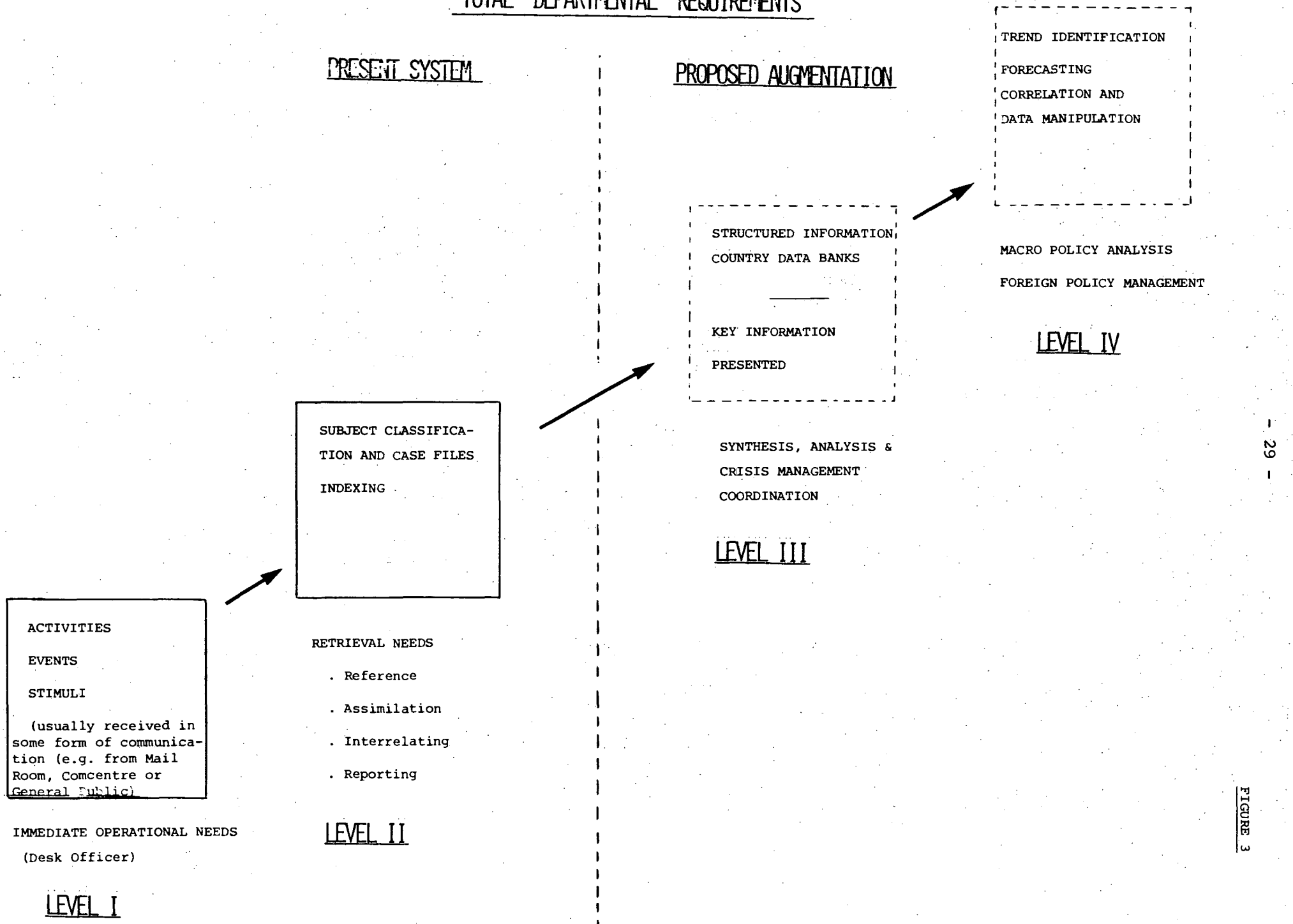


FIGURE 3

e) There should be a Director of Information Systems who would oversee the complete system, with responsibility for both operational efficiency and effectiveness and for responding to changing Departmental needs.

CHAPTER IV

THE PREFERRED SYSTEM

Basic Features

73. The system criteria and survey conclusions derived in the preceding chapter provide the basis for developing a coherent plan of action to solve the whole set of problems associated with records management in the Department. The process has involved consideration of a number of options embodying both organizational and procedural changes, along with a variety of possible applications of new equipment. (These options and the state of the art in the field of information-handling technology are treated in some detail in Chapter VI.) Out of these various elements it has been possible to work out what will be described henceforth as the "Preferred System".

74. The characteristics of the preferred system are largely the outgrowth of three key conclusions of the study:

- that there is a need for a marriage of the system to the user, resulting in the concept of Bureau Information Control Offices;

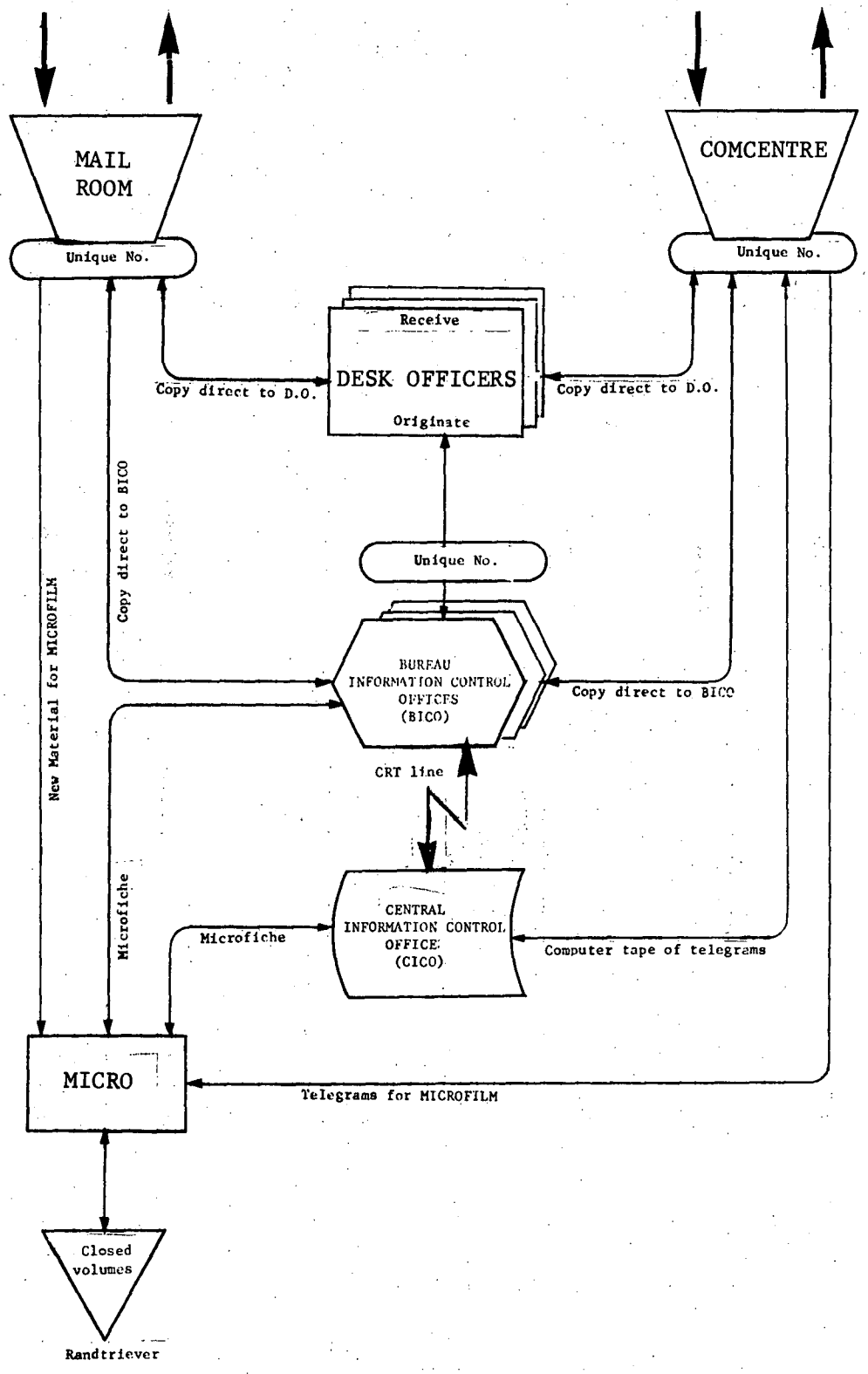
- that subject grouping of information is a natural and convenient approach to the handling of foreign affairs material, supporting the continuation of current subject classification procedures;

- that there is a growing recognition of the need for new tools to enable the Department to keep pace with its needs in both the operational and reflective aspects of its mandate, suggesting the use of automation techniques to provide the capability to handle the volume and response requirements and the flexibility to react to complex and changing demands.

75. Of particular importance to the success of this approach (or indeed any other that might be taken) would be the forging of a strong link between the desk officer (representing the use to which the information is put) and the analyst/indexer, or Bureau Information Control Officer, representing the control and handling of the information. For the sake of simplicity the term "desk officer" will be used to indicate anyone originating material or using information to that end. It is this link which would be most critical among all the information flow links and relationships in the system, an outline of which is shown in Figure 4. In describing the system, the approach will be to give an overview to establish the operating principles, followed by a more detailed description of each major component.

76. Referring again to Figure 4, it can be seen that there are two external entry points for material, namely, the Mail Room and the Comcentre. As a general practice, all incoming material, other than telegrams, would be routed through the Mail Room. (Certain special deliveries do not conform to this rule and exceptional procedures would be necessary for them.) Here, in addition to sorting and reproduction prior to distribution, some basic identification particulars about each substantive item would be entered into computer-based files via a keyboard terminal. More significantly, a unique sequential

PREFERRED SYSTEM



number would be allocated to each substantive item to enable it to be located, as required, through computer resident indexes, keywords and subject titles. Ordinary "housekeeping" material would be directed to the Sub-Registry in "C" Tower for processing and would remain outside the scope of the substantive information system. The original and as many copies as might be designated would then be distributed to the addressees, with the Micro-operations Section and the appropriate Bureau Information Control Office each also receiving copies.

77. The Micro-operations Section would sequentially microfilm all substantive material, creating a safety back-up feature, enabling lost or damaged files to be reconstructed and material to be copied for secondary users when the original is charged out in its file.

78. The copies of material sent to the Bureau Information Control Office would be used immediately for the file classification and indexing process. This would be a departure from present practice where these steps are not usually taken until after a document has been marked "File" upon completion of action on it. The Bureau Information Control Office could be likened to the former Sub-Registry since all relevant current files for the Bureau concerned would be kept there, but its capability would be much greater. Most prominent of these increased capabilities would be the Bureau Information Control Officer himself, who would not only classify and index all substantive material but also retrieve documents and carry out research for desk officers. At hand for this purpose would be microfiche of all closed registry-type files, the current "hard copy" files and a cathode ray tube (CRT) computer terminal with access to indexes, enabling complex searches to be made for both subject files, new subject groups and individual items. Before any retrieval could take place there must of course be the prior application of meaningful keywords in index terms for material placed in subject files. To do this, the Information Control Officer, upon receiving material from the Mail Room, would call up on his CRT the unique number entered in the Mail Room, analyse each item and enter his analysis into the computer resident files.

79. Turning now to the incoming telegrams, Figure 4 shows the first point of contact to be the Comcentre, involving no departure from current practice. A unique number would be added to each telegram automatically, corresponding to the same step for written material, and the desk officer would receive his copy immediately in the normal way. A copy would simultaneously go to the Bureau Information Control Office where it would be indexed in the same way as other material and from this point on it would follow the same procedural course through the system. However, the installation of the message switch expected within a few months will allow the creation of computer compatible tapes containing the full text of all telegrams received. A copy of this tape would be made available to the substantive information system, thus providing the means to develop a telegram display feature to cater to senior management and other special needs described in Chapter V.

80. Substantive outgoing and inter-divisional material has only one source point among the elements identified in Figure 4, this being the desk officer. To conform with the need to give a unique numerical identification to each item, the desk officer would pass any material he originates directly to the Bureau Information Control Office where the numbers would be allocated. Telegrams would then be routed to the Comcentre for transmission and local distribution in the usual way. Following transmission the Bureau Information Control Officer would carry out the analysis and indexing. Material destined to leave the system to posts, other Government departments or outsiders would be routed to the Mail Room, while the analysis and indexing would be based upon

the file copies. Inter-divisional memoranda would be allocated their unique numbers before leaving the originating Bureau but the analysis and indexing would be done through the CRT by either the originating or recipient Bureau, or by a combination of both as most appropriate. The Micro-operations Section would receive a copy of each item in order to maintain the sequential file of outgoing material on microfilm.

81. The above procedures would cater to all types of incoming and outgoing material other than documents generated by international institutions, special documents and reports. These would require different handling and would be passed to the relevant sections for storage and indexing. As appropriate, the indexes to these various types of documents could be entered into the system to expand the information base available to the Bureau Information Control Officer through his CRT and the computer.

82. Supporting the Bureau Information Control Officers would be the Central Information Control Office. Here would be the system management centre with responsibilities for ensuring the availability of computing power to drive the CRT terminals, the maintenance of master indexes and the management of the pool of staff both in the Bureau Offices and throughout the system. Here also would rest responsibility for liaison with those concerned with the operation of special features for Level III and IV activities discussed in Chapter V.

The Desk Officer

83. The desk officer (as defined in the widest sense) would play an integral part of the overall system, although in past studies of records management he has implicitly received insufficient attention because of an emphasis on organizational and procedural changes. It is intended that the preferred approach should place the Departmental information storage and retrieval system on a firm foundation by making a focal point of the desk officer and his needs. The proximity of the whole range of Departmental information which would be placed conveniently at his disposal through the Bureau Information Control Officer should develop new, hopefully more efficient working habits such that the Departmental files become, as far as is practical, desk officer operational files. His point of continuous and close contact would be the Bureau Information Control Officer and it would be the interaction between the two of them which would provide the necessary two-way feedback, so that the system would be sensitive to growing and changing needs, or to shortcomings as they might emerge.

The Bureau Information Control Office

84. It was appreciation of the needs of the working level officers which led to the conclusion that the registry function had to be brought into close association with the users. The Bureau Information Control Office must be recognized as the key element in the "Preferred System". From among the various possibilities the selection of the option to return to a form of decentralization is clearly the most important that could be made because this organizational change would shape the development of the entire system. Some of the shortcomings perceived by working level officers in the present system could be ameliorated to a certain limited extent through the re-establishment of Sub-Registries of the kind operating before the move to the new building; but it must be emphasized that in the proposed Bureau Information Control Office, supported by the capabilities of modern technology, much more is envisaged than a return to traditional Sub-Registries.

85. The unit would be supervised by the Bureau Information Control Officer who would be non-rotational and of at least quasi-professional grade, given that his duties would be comparable in degree of difficulty and responsibility to those of a librarian. He (or she) would report in the first instance to the Director-General of the Bureau to which he was attached and the Bureau would provide an appraisal of work performance (appraisals would also be made by the Central Information Control Office). It would be the corps of these Bureau Information Control Officers who would, in part, maintain the institutional memory and provide the information bridge for the rotational desk officers.

86. Organizationally the Bureau Information Control Office would consist of at least one Information Control Officer, charged with the responsibility for analysis and indexing of all substantive material related to his Bureau. He would also be expected to be thoroughly conversant with the files in his domain so as to provide comprehensive retrieval services for desk officers. Supporting him in this task would be a registry clerk (rotational) who would assist in as many ways as his experience would allow, but generally in the 'putting away' of material or files and in simple file classification and retrievals. The office would provide an ideal training ground for CR's destined to post registries abroad which are difficult to simulate realistically in the present Central Registry.

87. It can be seen that the analysis and indexing of most material flowing through his Bureau would be a prime function of the Bureau Information Control Officer. There are schemes being developed to have indexing actually done by the computer itself but the techniques are very far from proven and there is serious doubt that the kind of material encountered in this Department could ever be satisfactorily indexed without the judgment and discretion of a trained analyst. It would therefore seem useful to describe the various steps in the indexing procedure envisaged:

(a) The analyst at his CRT terminal would key into the machine certain facts about each document to be indexed/analysed, such as:

* unique sequential number
* originator's number
* originator
* purpose or designated subject
* type of document
* date
* addressee(s)
* file number assigned

together with a number of keywords or descriptors. With regard to the keywords he would, if necessary, consult a computer-stored thesaurus.

(b) This data would be accepted by the machine and its "software" programmes would cause the data to be stored in computer files which would enable rapid searches to be made on any identification data or keyword or combination of both.

(c) Upon identifying an item of possible interest, the analyst could cause to be displayed on his CRT screen all of the descriptors used to identify that item. A decision could then be made as to probable interest in that item and if

"hard copy" were desired, the subject file number would point to its location.

(d) For items in closed volumes, a microfiche address number would be displayed. The user could then retrieve the desired microfiche manually. and if "hard copy" were required after viewing, this would be provided.

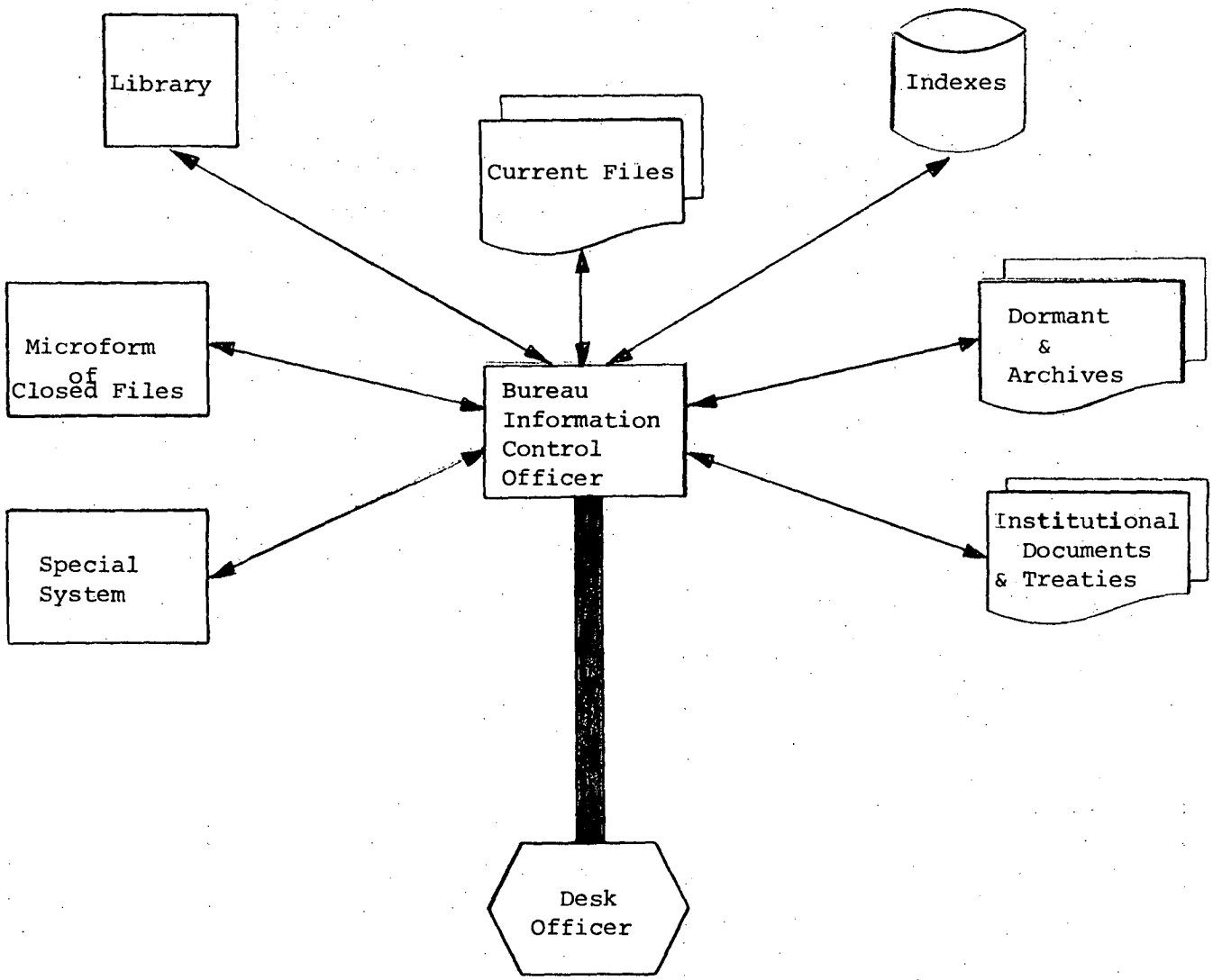
(e) The logging in of material immediately upon entry to the system would enable any analyst to key in a number to determine whether or not an item had been already indexed by the analyst associated with the "Action Addressee" or originating Bureau as the case might be. He would then be able to add file numbers or keywords from the point of view of his own Bureau which might not have occurred to the principal analyst. (This capability would provide much greater flexibility than is possible in the present system and would also avoid duplication of effort and errors.)

88. Files held in the Bureau Information Control Office would be subject to tight control as to condition, content and scheduling for removal. Upon reaching a predetermined size or age each volume of current subject files would be closed and forwarded to the Randtriever Section, which would be the home for all closed "hard copy" files. Prior to being filed away in the Randtriever, each closed volume would be passed to the Micro-operations Section where a microfiche would be made containing all material in that volume. Sufficient copies would be made of these fiche to allow for distribution to all Bureau Information Control Offices. In this way each one would have direct access to all closed Departmental files, and rapid indirect access to current volumes through inter-office requests, in both cases utilizing the CRT for search of the computer index.

89. The Bureau Information Control Offices would probably be located near the conveyor system outlets and would thus be able to utilize full-time the messengers at these sites who are at the moment under-employed. Between deliveries (which are likely to be on demand rather than scheduled) the messenger would be able to provide some clerical assistance as required.

90. The Bureau Information Control Officer would have at his disposal a variety of tools to reach into the total information store of the Department. Primarily he would be concerned with the microfiche files of closed volumes, the computer resident indexes of all Departmental material available and the hard copy current volumes resident in the office. The office would have a microfiche reader/printer which could provide desk officers with "hard copy" on request. Alternatively the microfiche could be charged out to them for study in inexpensive viewers in their own divisions. Figure 5 illustrates the range of information resources available, which would include the Library, access to bibliographic data banks, the Press clipping index, "country" data banks and international institutional document centres. The fact that the Officer would perform retrievals from the material which he had himself indexed and classified would help to develop an understanding of the type and depth of indexing required.

FIGURE 5



INFORMATION RESOURCES

This, together with consultation with the desk officer about the proper application of the Records Classification Guide and to formulate search strategies would encourage a much higher level of support than has been traditionally possible.

91. An important aspect of the Bureau Information Control Officer's work would be the element of control. Strict control measures would be required to ensure that material moving through the system would be properly identified and logged with its identification number as soon as it was received. This aspect, together with the more professional-level tasks of indexing would be monitored by the Central Information Control Office to ensure a consistently high quality is achieved and maintained. (The problem of the thesaurus is discussed further in paragraphs 139 to 141.) A related function would be the control of inputs for the special features systems derived from material originating in the Bureau (e.g. memoranda to the Minister and country data). The Central Information Control Office would be involved in this process in conjunction with the Information Control Office serving the Under-Secretarial Group, the Central Staff and the Policy Analysis Group.

The Central Information Control Office

92. An important function of the Central Information Control Office would be to ensure that the Bureau Information Control Offices provide satisfactory service to their Bureaux. This would be carried out by monitoring the analysis and indexing operations on a sample basis, by liaison with Bureaux "user" officers to maintain an awareness of their needs and complaints, and by assigning Information Control Officers throughout the system according to their capabilities and experience.

93. At the same time, the Central Information Control Office would be required to monitor the computer operations to ensure the provision of optimum support to enable the Bureau Officers to carry out their on-line indexing activities without impediments. This would involve ensuring that the information system had priority call upon the computer while providing all reasonable assistance to such other Departmental programmes as might be agreed upon. The Central Office would also be responsible for maintaining master copies of each form of information storage other than "hard copy" files (e.g. microfilm, microfiche, computer file).

94. Thirdly, there would be a requirement to liaise with such groups as PAG, the Central Staff or the United States Division in the development of systems based on substantive information files, to the extent that not only would advice and suggestions be expected of the Central Control Office but also the implementation of operational procedures and the manipulation of information as required by the "user" group.

The Micro Operations Section

95. At this stage in the project no final conclusions have been reached regarding the detail of the micro-technologies to be used in the system, although it is clear that the shape of the "Preferred System" as now conceived calls for the application of such technologies to obtain the requisite space-saving and accessibility. Some further examination has yet to be made of the two dominant microforms -- microfilm/microfiche and video form.

96. However, the conveniences of microfiche in handling, viewing without automated equipment, reproducibility, portability and comparative low cost appear to be suited to the needs of the system. The arguments for using roll microfilm may be less strong, but compatibility of technique may be an important factor for some applications within the system. It has been assumed, therefore, that the two dominant forms of micro-storage in at least the early stages of operation would be microfiche and film, and that the role to be fulfilled by microform is more important than the technology to be employed.

97. The initial film operation would create a sequential file of all substantive items entering the system to provide a security back-up as mentioned in paragraph 77. In order to avoid material entering the system being delayed because of the microfilming operation, it would be necessary for the Micro-operations Section to receive its own hard copy of all substantive material. The master film as generated would be passed to the Central Information Control Office to become part of the information base accessible to all users of the system. Past experience indicates an addition to the file of 1300 items daily, probably normally manageable on a single roll of film.

98. The other major operation of the Section would be the creation of microfiche for closed volumes. One volume would generate one fiche as a normal rule. A generous estimate suggests that some thirty volumes per day may be closed throughout all the substantive files, but this would depend upon the size and age criteria to be established for closing a volume. Upon creation of each fiche the requisite number of copies would be prepared for distribution to all Bureau Information Control Offices and the master copy would be forwarded to the Central Control Office. This new form of information file would of course be recorded in the computer-based indexes. Probably the existing subject file number would be used for rapid retrieval. A major start-up task would fall in this area, that of preparing fiche of all existing closed volumes currently stored in the Randtriever. It is estimated that each Bureau set of microfiche of the total closed substantive files of the Department would only occupy the space of a desk top in the Bureau Information Control Offices.

Closed File Storage -- The Randtriever Section

99. The Randtriever operation at present has two main tasks, the storage and retrieval of all registry files and the placing of new material on the relevant files. Under the new system this latter function would now be carried out in the Bureau Information Control Offices where all current files would be held, while the storage and retrieval of the Randtriever function would be much reduced since only closed and dormant files would reside there. The traditional functions of scheduling files for archives would of course still be centred on this old registry section. Some care would have to be exercised in monitoring closed files from the time of being despatched from the Bureau information Control Office to the Microfilm Section on their way to the Randtriever, but the problem would be essentially no different from the handling file movements in the present Registry.

The Mail Room

100. The "Preferred System" would leave the Mail Room substantially unchanged in structure. Bagging, sorting and copying operations would continue there. However, though small in magnitude, the changes to be made would be

large in significance. The first impact of such changes would be felt in the flow of material through the Section. Strict control of movement and sorting of material would be required. Immediately upon the separation of the "housekeeping" and "substantive" material, the "substantive" items would be allocated and stamped with a unique number, which would then appear on all duplicated copies. Basic identification data linked to the unique number would then be entered into the computer via a keyboard terminal, causing the physical presence of the material to be recognized by the system. From that point on it would be possible to monitor the progress of each item through the indexing and filing steps by reference to the unique number, which would also appear again as an identifier for use in retrieval.

101. As noted earlier, there would be one other minor change, that of making two extra copies of each item to provide the Bureau Information Control Office with a copy for immediate analysis and indexing and to enable the Micro-operations Section to create the sequential microfilm file. It is worth mentioning here that while these two copies would be necessary to avoid the microfiling and indexing processes causing any hold-up in the flow of communications to addressees, the several copies being made in the present indexing process would be eliminated.

The Comcentre

102. The impact of the "Preferred System" on the Comcentre would be marginal. Although the details have not been worked out there do not appear to be any insurmountable difficulties about assigning a unique number automatically to each telegram through the message switch. The unique numbers would thus be incorporated into the tape record for each telegram and the number would appear on all printed versions of the telegrams. As mentioned in paragraph 79 tapes from the message switch would provide the capacity for the operation of special telegram display features. Apart from these changes telegram distribution would take place virtually in the same manner as at present, with the Bureau Information Control Offices receiving the copies which now go to the Central Registry.

CHAPTER V

POLICY FORMULATION AND CORRELATION -- INTERDEPARTMENTAL COORDINATION

General

103. Chapter IV presented the "Preferred System" as a development to deal with the "core" information storage and retrieval requirements of the Department. Under the heading "General Conclusions" in Chapter III, paragraphs 70 and 71 introduced the concept of Level III and IV activities requiring special features which would form extensions of the "core" system. This was portrayed in Figure 3 on page 29.

104. A significant phenomenon in both private enterprise and among government departments is the rapid growth of the so-called Management Information System, commonly referred to as MIS. The general idea is that the power of the computer should be harnessed to accumulate all data relevant to the operation of an organization so that it may be manipulated for presentation in the most meaningful manner to assist senior management in the decision and policy-making processes. This approach has yielded benefits in private enterprise and holds promise in various sectors of the public service. The experience of others suggest that External Affairs will gain benefits from electronic data processing in the personnel, financial and administrative fields. What has so far not been explored in depth is whether there is scope for the application of the computer and peripheral facilities to the process of the formulation of foreign policy. This is not meant in any way to suggest that the computer itself could be used to yield answers to foreign policy questions, but rather that a comprehensive computer-supported information system could provide valuable supplementary tools for the conduct of Canada's international relations.

105. An outsider might be inclined to wonder how this Department carries out its foreign policy and coordination roles effectively while operating a rotational service and without any visible information systems support other than the traditional Registry. The answer lies in a heavy dependence on the human memory coupled with frequent expenditure of extra effort by those required to produce papers at short notice. Most officers with some length of service in the Department can cite important cases where it had been necessary to patch over unfortunate situations resulting from shortcomings in the system. It not infrequently happens that desk officers have to wrestle with problems where, unknown to them, useful previous work has become obscured by an overburden of later strata in the Departmental files. Much energy can be uselessly expended "reinventing the wheel" so to speak. Worse still, other Departments and even representatives of other governments can and do become aware of important gaps in the knowledge of Departmental officers. The remedy would seem to be to build up for each sector a structure of significant documents to be available for rapid retrieval and presentation separate from the regular files. This function would form part of the Level III activity shown in Figure 3. The need for a serious effort to be directed towards dealing with this aspect of Departmental activity is already being increasingly felt in various quarters. That the substance of Canadian international relations continues to grow in scope and complexity needs little amplification. Failure to take steps to deal with the problem now will only mean postponement to a later day when more drastic action will have to be taken to cope with a more difficult situation, perhaps one by then involving public evidence of Departmental operational shortcomings.

Country Data Banks

106. Much thought has already been given to this general subject by the Policy Analysis Group. In one direction the Policy Analysis Group has made a start in a project to develop sets of "country" data for some forty-one countries. It would appear from this exercise that from the External Affairs point of view information on countries falls roughly into three categories: basic unclassified data; unclassified data dealing specifically with the relationship with Canada; and classified information on policy and sensitive issues bearing upon the relationship with Canada. It seems probable that a quite comprehensive range of data could be stored through use of a computer and subsidiary devices and available for rapid retrieval as well as a certain amount of manipulation. The success of such general country data banks would depend on procedures to ensure the regular and timely input of raw material and up-dating amendments from sources both within and outside the Department. The Bureau Information Control Officers, in cooperation with desk officers, would have major responsibility in this regard under central guidance. Once well established, a system of country data banks would give External Affairs a very effective tool as an adjunct to the coordination role. This feature of the information system should also prove particularly useful in conjunction with the annual country programme exercises which now receive so much attention.

107. As an evolutionary development from "A Foreign Policy for Canadians" and the "Third Option", ministers have had occasion in recent months to consider the overall conduct of relations with the United States and have prescribed the coordinating role of the Secretary of State for External Affairs and of this Department in this most important of all areas of Canadian foreign policy. In parallel with the general country data bank concept evolving in PAG, others in the Department have been considering the setting up of a very comprehensive data bank dealing solely with Canadian-United States relations. This field is so broad and complex, and involves so many interests at the federal, provincial and private levels that it will require a major effort to make even a start. Discussions have been held with the United States Division about how the matter might be pursued.

108. Once embarked upon, the Canada/United States data bank would absorb significant effort as well as computer capacity. It would probably therefore be wise to develop the techniques first on a somewhat smaller scale, yet still calling for substantially more elaborate material than in the set of country data banks contemplated in paragraph 106 above. There immediately come to mind the possibilities for detailed monitoring of the Canadian relationships with either EEC or Japan, two entities of substantial interest to Canada. Either one of these would present a sufficient challenge for a meaningful pilot project, while hopefully providing some useful results at the same time.

109. It is envisaged that the proposed Director of Information Systems would work in concert with PAG, the Central Staff and the Geographic Divisions in devising the criteria and techniques for building up the structures of all three types of data bank.

Presentation of Telegrams and Current Documents

110. One of the problems faced by senior management is to be able to maintain a grasp of all the main threads of international developments and Canadian involvement in them. Apart from matters brought up for action or decision, the daily telegram "pack" of substantive messages provides some assistance but imposes its own burdens on readers. Alternatives will become possible with the installation of the message switch due this year. For example, each day's telegrams could be placed in temporary storage in a subsidiary system. From there, anyone using simple procedures on a CRT could call up and scan all the subject headings, recording those in which he had an interest as he went along. As a next step he could call up the lead paragraphs of those of concern to him, or the full text as he might choose. Telegrams could be held in the subsidiary system for recall for a number of days, perhaps as much as a week, after which they would of course always be recoverable from the main system. This approach would only yield the minimum benefits if originators of substantive telegrams would accept the necessary discipline to adopt as standard practice the drafting of comprehensive lead paragraphs. This aspect is discussed in more detail in paragraphs 180 to 187.

111. Along with the daily telegrams the system could also store and present all current memoranda to the Minister. Similarly, Departmental memoranda before Cabinet and major items before Treasury Board could be identified by subject and purpose, and their current status recorded, such as dates of scheduled Cabinet Committee meetings and Departmental representation if required. Current memoranda to Cabinet originating in other departments could be added to the list where the Department had an active interest. The system could also accommodate questions either before the House of Commons or anticipated, and the suggested replies. The rapid input of most of the material into the subsidiary system would be the responsibility of the various Bureau Information Control Officers, in collaboration with the Information Control Officer attached to the Central Staff, and under the guidance of the Central Information Control Office. The selected telegrams taken together with this other material could provide a useful basis for discussion at a daily meeting of the Under-Secretarial Group perhaps prior to the Under-Secretary's usual morning session with the Minister. Aside from being of value to the Under-Secretarial Group, a facility of the kind described would receive constant use from the Press Office. On occasion, Directors-General or other officers in Bureaux might avail themselves of information in the system with the Assistance of the Bureau Information Control Officers through their CRT terminals.

POPSUM

112. The telegram "pack" provides the basis for the selection and production of POPSUM* which has forty-two subscribers outside the Department and wide internal circulation. A survey conducted in December, 1974, yielded a majority opinion that readers valued POPSUM and wished the service to continue. The circumstances in which POPSUM is produced place rather severe limitations on its potential for development and on the quality of the product itself. The

*POPSUM is a summary of selected telegrams and wire service news items circulated by 9:00 a.m. each day.

capability of rapidly scanning the day's telegrams by CRT through the subsidiary system would give the editor of POPSUM a very flexible tool. Moreover, the acceptance of a certain amount of discipline by originators in the writing of lead paragraphs would enable the use of "Computer Output Microfilm" (known as COM) or a computer impact printer to produce an almost ready-made POPSUM text according to selections made by the editor, and direct Xerox reproduction would probably be feasible without the delay of an intermediate typing step.

Key Policy Documents

113. The day-to-day work of the Department produces a wide variety of material. A great deal of it is necessarily of an ephemeral or transient nature but out of the general flow policy issues arise. These call for Ministerial or Cabinet decisions requiring the writing of situation reports and memoranda embodying recommendations. It is these documents, which represent the syntheses and analysis of a large volume of material, that are of most lasting value. All too frequently in the handling of very active subjects (Indo-China, Cyprus, the Arab-Israeli conflict) multi-volume files are rapidly built up which tend to bury the critical documents within a mass of paper. The situation is not helped by numerous gross filing malpractices. Many years have gone by while the need to do something about these shortcomings has been building up. It is therefore proposed that over a period, say six months, the various Bureaux, with the assistance of their Bureau Information Control Offices, should develop sets of key documents on the main past and present policy issues to be found within their jurisdiction. These would be carefully indexed in the computer and produced as separate microfiche for each set for rapid retrieval. Being of relatively much higher value than "raw" data, such as telegrams and letters, these microfiche sets would be up-dated with each new increment of significant material. Xerox copies could be made from the microfiche on request.

Conferences and Canadian Delegations

114. The Central Staff and the Operations Centre have recently been given coordination and control functions in connection with international conferences held in Canada. This will involve storing and utilizing a fair amount of data, a process which might well be appropriate to the application of computer techniques. Similarly, computer capabilities could be employed in meeting the responsibility to be assigned to the Central Staff with respect to the administration of a revised Cabinet Directive No. 41, prescribing the coordinating role of External Affairs with respect to Canadian participation in international conferences abroad.

Comments

115. The foregoing has been presented to demonstrate the potential strength of the system and to outline some of the opportunities which could be opened up by the application of modern techniques. The state of the art is still moving rapidly in this field but even within well-tested technology a wide array of possible applications is available. There appears to be consensus in the Department that there is a dearth of accessible "structured" information, that is, what has been suggested in Figure 3 as pertaining to or leading to Level IV activity. To an appreciable extent it would not prove feasible to obtain satisfactory results from Level IV activity (conceived of as embracing

macro policy analysis, trend identification, data correlation and manipulation) until a sufficient body of material had been assembled under Level III activities. Whatever other benefits might be derived, the existence of country data banks and sets of key policy documents would be invaluable to any officer receiving a new assignment at home or abroad, or to anyone encountering a new subject for the first time.

116. It is envisaged that the creation of subsidiary systems to serve Level III and IV requirements could provide the means to give particular support in times of crisis and their design should take that possibility into account. The proximity of the Operations Centre would be an advantage in that its facilities could be developed in a complementary way.

117. It would be premature to attempt working out the details of the Level III and IV subsidiary systems, or to suggest precisely what equipment should be used. Whatever shape the systems might take, they would of course rest on the underlying foundation of the "core" information system which would provide the basic capabilities and from which the selected information would be drawn. To obtain optimum benefits, the systems should be developed and evolve as the product of a continuing interaction between the Director of Information Systems and those such as PAG and the Central Staff whose responsibilities demand a perception of overall Departmental requirements.

CHAPTER VI

OTHER OPTIONS AND OTHER SYSTEMS

118. The "Preferred System" and the subsidiary special features are the natural outcome of considering the Departmental requirements in the light of the state of the art regarding information retrieval systems. Although the launching of the project itself had fallen within the responsibility of the Departmental Electronic Data Processing Committee it was first necessary to determine whether it was a valid assumption that the best solution to the records management problems could only be found through the introduction of automation techniques. Two options based on traditional methods must therefore be considered.

Retention of the Present System

119. An attempt could be made to continue working on improvements within the present Records Management Division. These would be in the direction of upward reclassification of a number of the key personnel, principally the records analysts; some general reorganizational changes involving some re-classifications and the creation of more non-rotational positions; persistent efforts by Personnel Operations Division to keep the Records Management Division up to full manning level strength; changes in some procedures and a tightening up of operations generally. In the short run, limiting efforts to improvement of the present system would be temporarily more comfortable and have less traumatic effect than more radical changes. In the longer run the fundamental weaknesses would become more accentuated with increasingly deleterious effects on Departmental operations. Given the observed experience of the past twenty-five years, it would seem fair to say that the normal bureaucratic constraints within and outside the Department, and the pressures of other Departmental operational demands in a largely rotational service would tend over time to erode most improvements in the Records Management Division. Moreover, the major drawback of lack of close contact with the desk officer, so evident in the Departmental survey, would not be corrected. Physical separation also causes a psychological separation between the analysts and desk officers, which is difficult to overcome when their only contact is over a telephone.

120. Equally serious is the rapidly accumulating mass of keyword index cards held in the Kard-veyer equipment. This procedure was established in the belief that it would prepare the way for automation. Sampling of the index shows that under present arrangements the necessary quality for computer output is never likely to be achieved, and as an index to support a manual system it cannot yield benefits commensurate with the financial resources and effort being expended.

121. On these various grounds any plan of a largely palliative nature must be rejected as likely to fall far short of Departmental needs. Worse still, the potential for enhancing the quality of Departmental performance and of augmenting the general capacity would remain obscured and unrealized, particularly with respect to the Level III and IV activities.

Manual System Partially Decentralized to Bureaux

122. This option, if fully implemented, would undoubtedly bring some direct benefits to the desk officer users. It suffers, however, from some of the general criticisms described above and operationally would be more sensitive

to personnel difficulties than the present centralized organization. There would be the further serious drawback of having to adapt decentralized manual indexing to the Kard-veyer system now in use. The present indexing is of lamentably low standard but the level attainable at isolated sites would be lower still unless reinforced by major upgrading of personnel. Apart from the indexing aspects there would be some other difficulties. It would be necessary to have material travel back and forth through the conveyor system between the analyst and the Central Registry. Both material for 'Put Away' and the files themselves would be involved in this traffic. Furthermore, when the desk officer and analyst had identified which files they wished to retrieve, the request would be made to the Registry, yet another party, which would then retrieve the file and place it in the conveyor system. It is this procedure, together with other reservations about the quality and speed of work, which has caused the users largely to ignore the Registry and develop their own files. The dependence of the analyst upon the Registry and delivery systems, where responsibility for performance would be dispersed among a number of people making control difficult, would render him little better off than the desk officer is at present. For example, filing or retrieval errors could not be detected by the analyst until delivery of the file to the analyst in the Bureau. Massive paper movements through the system would result in 'put away' peaks and lags, with the latest material not being available upon the file being requested from the Randtriever. This would be likely to be a common occurrence since active files would always be travelling back and forth, with 'put away' papers rarely catching up. Moreover, placing analysts in Bureau centres with adequate clerical support to accomplish anything at all worthile would call for a substantial number of additional personnel because of necessary duplication of personnel in the Central Registry. Retaining a manual system with analysis and indexing in the Bureaux must therefore be rejected as unsatisfactory.

123. It follows that there would be merit in bringing back the files to the Bureau, that is, in re-establishing the Sub-Registries. This would be a major improvement, (although expensive in personnel) and the logic of it is indeed what has been adopted in the "Preferred System". However, all the difficulties inherent in the manual indexing and central Kard-veyer system would remain. The reconstitution of the Sub-Registries in traditional form must therefore be regarded as at best an inadequate half measure capable only of restoring service to approximately the standard existing before the move to the new building.

State of the Art

124. It has been shown that neither the existing system, nor any improved version of a manual system, is ever likely to give wholly adequate service to the Department in the face of present-day demands and conditions. In the search for the optimum solution to the problem a wide variety of modern techniques were examined. Some of the findings have been incorporated into Annexes IV, V, VI and VII on "Technical Aspects Related to Functions", "The Use of Optical Fibres in Computer Communication", "Microform and "Optical Character Recognition".

125. There is no doubt that automation technology has achieved some striking successes in certain applications in both the private sector and in government. But there were also some early costly failures resulting from lack of proper determination of the needs of the organization in relation to the technology to be applied. Computers are now being widely used for information storage and retrieval systems but there are no standard proven total solutions relevant to the needs of this Department. The main reason is that complex substantive subject files with daily accretions do not fall into categories for which general solutions have been found, such as structured texts (e.g. scientific

papers, reports, books) and case files with a fairly strict format (e.g. the insurance account file where a foreseeable limited number of transactions will take place against any one account number). Other organizations, such as the U.S. State Department, the Swiss and Foreign Office and the EEC are dealing with this same problem. At the present time, there are no fully implemented systems which do not have drawbacks from the point of view of this Department's particular needs. Nevertheless, each has some experience of value which has been of assistance in the selection of what is believed to be the most suitable approach.

126. In order to form a manageable framework within which to examine the state of the art the various essential elements of the system were identified and studied individually and in relation to the total system. These elements are:

* Information input
* Information storage
* Information processing
* Information retrieval
* Indexing/thesaurus techniques

Information Input

127. The system will be expected to handle in the order of 300,000 substantive items per year, of which perhaps 90,000 will be telegraphic communications. The rest will be an assortment of memoranda, letters, documents, Minutes, situation reports and policy statements. With such diverse categories of material, problems are encountered if full text storage in other than original "hard copy" is desired. The telegraphic communications will pose no difficulty since the new message switch will retain them for a magnetic tape transfer from the communications to the substantive information system in machine-readable full text.

128. One aspect of dealing with material in machine-readable form which should not be overlooked is that at one stage the text was converted from original "hard copy" by a second physical act of striking keys for each letter. In theory, a similar approach could be taken for all items received in the system by keying their contents on to magnetic tape. This is not a practical proposition because of the length of many items; furthermore, it duplicates, stroke for stroke, the work of the typist who prepared the text initially. Because many organizations have faced this problem, industry has applied itself to finding a solution and has come forward with the technique of Optical Character Recognition (OCR) in order to place plain language text into the computer. The limitations as to format and font type imposed by OCR would seem to confine use of this technique to material originating within the control of the Department. Well structured items, such as Memoranda to the Minister would lend themselves to OCR more readily than inter-divisional memoranda and letters, while the possibilities for telegram input are amply demonstrated by the success of the U.S. State Department and the German Foreign Office. Further exploration of this technology will be made in Phase II, in conjunction with a probable rival in the shape of Word Processing (Power Typing). The use of special typewriters with magnetic tape attachments, or links to a central controller with disk storage, provides two benefits. The editing and multi-copying feature is already

being exploited in the Department. Of more importance from the information systems viewpoint, the magnetic tape recording could be converted easily into computer-readable form without any additional manual effort. These two approaches to capturing input could significantly lighten the manual workload involved in feeding the system and would provide, if needed, the basis from which to move into full-text storage or automatic keyword selection at some later date.

129. The full support requirements for Level III and IV activities have not yet been defined. It is, however, conceivable that while full-text storage would not prove immediately feasible for general application it could be used to great advantage for special features of the subsidiary systems in conjunction with CRT on-line terminals.

Information Storage

130. There are two major requirements for the storage of substantive information in the Department. These are availability for retrieval for analytic and operational purposes, and archival storage for historical purposes. Storage in either case must be subject to the two important criteria of providing access to both subject collections of information and individual documents.

131. The current system is virtually restricted to the use of paper as the storage medium. However, the range of possibilities for storage of the total substantive information file consists of microform (fiche and film), video tape files and computer-compatible (electronic) full-text storage as well as "hard copy".

132. From the archival point of view, foreign affairs files generally being among the most interesting historically for researchers, there is understandable resistance to any storage form which would eliminate either "hard copy" or subject collections of papers. This does not rule out a combination of existing "hard copy" in subject collections with other forms which have definite operational advantages. For example, microfilm/microfiche are desirable in a number of ways, particularly for space-saving, portability, ease of handling and the relatively low cost of reproduction. Use of microfiche enables large volumes of the same information to be stored economically in a number of locations. Microfiche readers and printers are in widespread use at the present time, and usually have a high quality of image projection. Microfiche are units or sets of information and are not very suitable for applications in which the units (or groups) increase in size day by day as in an ordinary file. They are therefore more suitable for closed files than current files. Roll microfilm, on the other hand, can handle incremental files, but suffers from the disadvantage that access to specific items in large volumes of information is cumbersome, all previous frames on any roll of film having to be sequentially passed to reach the desired frame.

133. A newer technology with similar aims to those of microform is that of video tape storage. The technique here is to take a 'photograph' of the material in the same way a TV camera does, storing the image on a magnetic tape in analogue or digital form. Because the medium is electronic, the images can be produced on a CRT terminal and selectively copied onto other tapes. This enables random selection for file-building and remote viewing. While somewhat more flexible in these ways than microfilm/microfiche, it is also a less proven and more expensive technology. It also suffers from the same disadvantage as

roll microfilm where very large files are involved in that access becomes cumbersome, requiring the mounting and remounting of tapes, and perhaps involving conflict among users seeking information from the same data base.

134. Currently the industry is seeking to develop techniques for marrying micro and video forms into one storage and retrieval system. The camera would transmit the image to a CRT screen. The system would attempt to harness the best of both video and fiche systems at substantially lower costs. The National Research Council has convened an informal committee to explore this general field to determine whether a development project should be embarked upon seeking solutions to problems being encountered among government agencies. In view of the current project in External Affairs the Department has been invited to participate in the work of this group.

135. Another important storage medium is computer-compatible tape or disk. The storage of full-text in machine-readable format provides perhaps the most flexible of the various techniques, since being in electronic digital form it can be used for presentation on a CRT terminal or it can be manipulated with understanding of its meaning. The major drawback of this technology is in the input process, which is usually more time-consuming or expensive than the photographic approach used for microform or video tapes. Expense can also escalate according to the amount of "on-line" storage facilities provided in the system.

Information Processing

136. In dealing with large amounts of information a method of managing the indexes, if not the material itself, is required. Techniques such as the Randtriever exist, which require knowledge of the whereabouts of the file to be retrieved, or the item required. In order to provide such an address, or even to identify the existence of desired material in extremely large masses, some processing power is required. This can be provided clerically but heavy manpower demands are made and the indexes of actively growing files prove difficult to handle as the size increases and flexibility decreases. The trend is now towards using computers for this function. The demands placed upon the computer are for adequate core storage to hold the necessary programmes and enough disk/tape storage to hold the large volume of indexes/pointers or possibly even full text. If CRTs are used this places further demands on the capacity of the machine.

137. It is possible to take a number of approaches in supplying this machine power. A popular tendency is to use "mini" computers to provide the capacity needed at any stage of development, adding modules or new machines as required. The major disadvantage of this approach is that "software" development devolves on the system developer since very little exists for this genre of machine. Furthermore, the combination of equipment usually results in unique systems with no direct precedents and, therefore, some degree of pioneering. "Software" shortcomings can prove costly. Larger, general-purpose machines have available "software" and expandable capacity but generally result in more expensive systems, perhaps at times excess capability, and use more staff. Falling between these two extremes are 'medium' systems which can start out resembling "minis", but with the ability to expand to a large system. While software support is better than with "minis", it is still not up to that available for general-purpose machine support.

Information Retrieval

138. Computers have become very common tools for providing a means of searching large volumes of information for specific items or groups of items. Two modes of operation are possible, batch and on-line. In batch-mode retrieval, requests are processed at regular intervals with no participation by the user while retrieval is taking place. The on-line retrievals is processed at the time the request is made and provides an interactive capability by which the user can modify or change his requests, depending on responses from the computer files. This latter capacity has been found to be particularly important for subject-oriented files where many different paths may be used in the search for information. Where a batch-system request, which requires three or four revisions in order to narrow a field down to a manageable size or to a relevant group, could give answers in a time-frame measured in days, an on-line approach could do the same thing in minutes. The costs for this much superior performance are more sophisticated "software" and a number of terminals, proportionate to amount of usage and number of users. With CRTs a new dimension in presentation of information is possible. For example, a system storing machine-compatible full-text (electronic, video or video/micro storage) can display any or all selections of text from any desired item. Similarly, full texts of abstracts can be presented. In those systems where only keywords and identification pointers are stored, linked to the location of the item(s) or class of items desired, it is possible first to call up statistics of the numbers of documents in categories as a basis for modifying requests. By interacting with the data in this way it is possible to narrow down a search or widen its boundaries to provide maximum returns. This capability greatly enhances the value and use of information stores, especially in an environment where more and more emphasis is being placed upon such requirements as immediate response and immediate access. The U.S. State Department, the Swiss Foreign Office and the EEC all use the interactive on-line retrieval technique, which is becoming the standard procedure for searching large-scale and complex files.

The Thesaurus Problem

139. A decision to index material by means of keywords carries with it the need to decide whether to use a thesaurus. A thesaurus, in this context, is a selection of words which, chosen for relevance to the subjects to be covered, are related to each other in hierarchical subject groupings, the very specific or narrowly interpreted words falling at the bottom of the hierarchy of each group and those with a broader meaning at the top. The structure of the current Records Classification Guide resembles that of a thesaurus as described here. The question of a thesaurus arises because the structure or framework it provides is useful in a keyword-based storage and retrieval system in a number of ways. For example, the indexer is assisted by having a subject reference tool which channels the description of each item into the most relevant keyword groupings. This demands that the sense of the item being described be fully understood in order to select the correct descriptions, particularly important in material which may not mention key-descriptors explicitly and which would be poorly identified by simply selecting words from the text itself. With respect to storing the descriptors the use of the thesaurus is also an advantage in that it considerably reduces the complexity of operations within the computer. Descriptors of newly-indexed material can be more easily updated into computer-resident files and hierarchical word groupings more readily assist retrieval searches.

140. Without a thesaurus random keywords will be presented to the system resulting in an open-ended file in the computer with no connections being made or relationships established between synonyms. To make these relationships known to the system would require operator intervention. The unstructured file of descriptors can become a drawback in retrieval. A completely unstructured list of keywords from which to choose will result in 'spotty' retrievals, that is, retrievals which do not identify all items of the relevant material because different keywords not associated with the subject by the searcher have been used as descriptors. In a complex subject environment in which there is no specialist terminology the lack of a thesaurus can drastically reduce effectiveness of the system, since all word associations and grouping must be done by the user each time he uses the system. With a large, uncontrolled keyword file this can become a major task.

141. Other foreign affairs related system developers have recognized this fact, witness the U.S. State Department and Swiss Foreign Office thesauri. It thus appears that the proper question is not "Whether to?" but "How to?" develop a thesaurus.

142. One answer to this latter question could lie in making use of the experience gained in other similar systems. To this end we have obtained copies of the U.S. State Department and Swiss Foreign Office thesauri (the latter in French), each comprising some five to seven thousand words.

143. Further study may show that our solution lies in another approach, since the adoption of someone else's thesaurus would necessitate amendments to suit the Canadian situation. If the Department should develop its own on-line thesaurus from operating experience no structure for keywords would exist at the start of operation of the new system. Upon material being indexed keywords would be entered into the computer-resident files where they would either create a completely new entry or would be grouped with earlier occurrences of the same word. Over a period of time the rate of increase of new words would decline and eventually stabilize. The file would of course be common to all analysts in the system.

Centralized Computer Indexing

144. The various technical possibilities having been described it is now possible to examine how they could be applied in the Departmental system. The first obvious application to consider would be the substitution of computer indexing for the deficient Kard-veyer system. This approach would likely be somewhat more economical of personnel than either the partial decentralization described in paragraphs 122 and 123 or the "Preferred System" itself. However, it would be remote from the users (as is the present system) and the many demonstrable advantages of Bureau Information Control Centres would be unattainable. There would be some support for Level III and IV activity but the development of practical procedures to provide systematic input for the subsidiary systems would be impeded. While implementation of centralized computerized indexing could probably proceed without any highly visible adverse effects it would probably turn out to be an expensive disappointment for the reason that its benefits would also not be very visible to users, with the result that a powerful potential capability would tend to be much under-utilized. This situation holds to a certain extent at the moment in the U.S. State Department.

Computer Indexing with Random Sequential Storage

145. The essential feature of such a system would be the storage of all material (both letters and telegrams) in the order received by the Registry, using computer indexing to locate material whenever needed. Users would only receive subject files constructed on request and made up of copies of the material in the file. The "hard copy" might also be placed on microfilm or video-tape. This approach could employ either centralized or Bureau Information Control Office indexing. It would be unworkable with the Kard-veyer indexing procedures as at present maintained, which perhaps is in itself an indictment of the latter. The arguments against adopting the random storage approach at this time are presented in part in paragraph 69 in discussion of the general conclusion that "subject files" in one form or another should be retained. In addition to the benefits in the retention of subject files it should be noted that it could become very difficult to go back to a system of subject files once the step has been taken to use random storage. Thus, while this option presents a perhaps elegant theoretical solution, it carries some risk of practical operational difficulties and the distinct disadvantage of being a sort of one-way street which, once entered, would be difficult to leave even if a new direction could be seen to have become more attractive. The dynamic design of the "Preferred System" does not preclude altering course to random storage at some future date without undue disruption.

Full-Text Computer Storage

146. On close examination this approach can be seen to be a more advanced version of random sequential storage discussed above. Some additional comments are relevant. While a highly responsive system could no doubt be devised, based on full-text storage, it is clear even without working out detailed specifications that only a large computer with extensive storage capacity would be capable of handling the full texts of all material. While all telegraphic material could be acquired through the message switch there would be problems about placing the texts of the large volume of other material in a storage form available to the computer. Only very expensive optical character recognition devices can at present handle a variety of type fonts; and magnetic card or magnetic tape typewriters could only be used for material originating in the Department itself. As a practical matter it would seem that non-telegraphic material would have to be photocopied so that action could proceed while the process of placing it in computer storage was set in train. There is also the question as to the best technique to be adopted for presenting "files" to meet users' requests. Lacking any certainty that full text computer storage would provide superior service, and given the high cost and practical difficulties, this option must be rejected for the time being. It is nevertheless recognized that the state of the art may advance sufficiently to render full-text storage feasible in the Department some years from now. As in the case of the immediately foregoing option, the "Preferred System" could lend itself admirably to development towards "full-text computer storage" if that should be the way of the future.

Other Systems

147. The exploitation of modern technology for information storage and retrieval has advanced quite far in a number of institutions in Canada and elsewhere. To cite a few there is the SDI system developed by the NRC; Quicklaw developed by Prof. Lawford; several large bibliographic data banks in the United States; the New York Times Data Bank; the University of Toronto on-line library cataloguing service. Most of these were found not to be directly relevant to the

problems faced in External Affairs. The majority involve the use of computers for indexing and retrieval of finite documents such as an article in a periodical, a particular scientific paper or a legal judgment. The techniques developed in these cases do have some limited application but do not go nearly far enough because the problem in the Department is to handle files undergoing the continuous accretion of papers dealing with complex subject matter. Computer methods which work quite well in many commercial enterprises or in Government departments whose operations tend to generate large numbers of "case" files are not generally applicable.

148. An examination was therefore made of systems in organizations with a similar function to External Affairs. These were different enough to allow useful comparisons and to suggest alternative approaches, yet similar enough to show that the fundamental needs were the same in each case. The key problem centred on the quality and depth of indexing needed, and raised two important questions:

* To what extent is machine assistance in the indexing task desirable, practical or feasible?

* What calibre of people are required to handle both the indexing (whether machine-assisted or not) and the retrieval aspects of the system?

While some degree of difference is evident in answers to the first question, there is unanimity in the answer to the second.

149. It was a general conclusion in the organizations visited that the size and complexity of the task of storing, identifying and retrieving substantive information necessitated machine assistance since the traditional manual methods were proving unable to cope with the increasing demands made upon them.

150. In Germany there appeared to be no conceptual differentiation made between the manipulative capabilities of the machine which could be harnessed, and the patent inability of the machine to make abstract analyses and draw conclusions from complex material. Paradoxically, the Germans had perhaps the most efficient and advanced on-line computer encryption and decryption communications procedures. At the same level of system development as the Germans but conceptually more in tune with the more advanced Swiss and Americans, the British Foreign Office would like to utilize machine support but is inhibited from so doing by physical security problems inherent in the occupation of a number of different buildings. Within a planning time frame of five years it is expected that the eventual move to one specific building or other steps will be taken to overcome the difficulty.

151. The rest of the group, the Swiss, the United States and the European Economic Community have approached the problem head-on with varying degrees of success. Although no visit was made a report has been received from Canberra outlining a very ambitious plan being embarked upon by the Australians.

152. The U.S. State Department has advanced furthest along the road to implementation and acceptance, though admitting to problems in this latter area and in the technical approach selected. Considerable resources are being brought to bear with the employment of two IBM 370/158 computers, along with much other equipment. Eighty-one per cent of departmental traffic is by telegram (higher than in External Affairs), all of which has been kept in computer-controlled storage since July, 1973. With the inevitably rising volume there is now some

concern that the capacity of 1.5 million items will all be taken up before the planned three-year period is complete. Secondary storage, off-line is provided in roll microfilm cassettes. The files of Bureaux and "Offices" (the latter equivalent to our Divisions) are maintained three years current, apparently largely by the secretarial staff with some monitoring by the Central Registry. The introduction of the computers has led to a somewhat higher retrieval rate in the Central Registry from both current computer storage and the older files but at about one-hundred per day in substantive subjects (excluding also consular where many posts abroad are in direct on-line terminal contact) the utilization of the State Department system is so far only about double External Affairs retrievals from the Randtriever. Given the disparity in size this would seem to suggest that desk officers' personal filing systems in Ottawa call for more support than do the "Office" files in Washington, or conversely that access to the organized "Office" files is to some extent regarded as superior to maintaining personal working files. The State Department classifiers/indexers, located together in the Central Registry, are virtually all college graduates, as are the "disseminators" in the communications system. Both indexers and disseminators use on-line CRT terminals. The latter group has responsibility for deciding all information addressees of incoming telegrams, a function that has been most effectively eliminated in the External Affairs system by requiring originators to determine all addressees (sometimes augmented by desk officers with particular knowledge of Ottawa needs). To assist the disseminators the State Department has introduced TAGS (Traffic Analysis by Geography and Subject), requiring each communication to bear special indicators. The State Department also has the computer-based SADI system catering to the need of the Secretary and Assistant Secretaries of State and others in the upper echelon of the Department to maintain an effective control over the movement of key documents and correspondence. This appears to be an overly elaborate and expensive system, given its objectives and what it accomplishes, and seems to be putting some strain on the computer capacity.

153. The Director of the Foreign Affairs Document and Reference Centre is now considering introducing CRT's to some of the Bureaux with the idea of bringing the Central Registry closer to the "clients". He also has commented that getting competent indexers has posed difficulties. Another important point, mentioned earlier, is that the reconstitution of files from randomly stored material has proved to be disappointing, being relatively slow as well as costly.

154. The Swiss Foreign Ministry have been determined to strengthen their information system in the political and economic sectors and ran an indexing and retrieval experiment utilizing full-text computer storage. Although this had to be discontinued for budget reasons they are determined to go ahead again soon. Their experiment, conducted by foreign service "political" personnel, did demonstrate that the writing of abstracts or précis by the indexers involves far too much time and effort and that reasonably good retrievals can be obtained from key words alone. The Swiss were kind enough to provide a copy of their French language thesaurus which could be of considerable value as the basis for building a Canadian version if it is decided one is needed.

155. The European Economic Community has set up a system called ECDOC using computer indexing and retrieval for the formal reports, documents and Minutes generated within the very large bureaucracy of the Commission. The

documents dealt with tend to differ from External Affairs material in that they do not form part of daily increasing files of telegrams and letters, being more like the kind of documents going to the Minister or Cabinet. Being less ephemeral in nature, somewhat more elaborate indexing procedures are appropriate than time would permit in handling a daily flow of communications. What was interesting to find, however, was a corps of quasi-professional Bureau Data Officers, generally university graduates, working through on-line CRT terminals and closely integrated in the Bureaux to which they were attached. Retrievals through the index produces titles and brief abstracts and the addresses of microfiche holding the complete texts of the items desired. Correspondence files, however, are not covered by the ECDOC system which is still in an early stage of operation and facing problems of acceptance and cooperation by some apparently very autonomy-minded Directors-General of Bureaux.

156. The Australians are embarked upon a major project, the heart of which appears to be a large message switch. The scale of the project is necessarily large because the Communication system apparently must meet the internal requirements of the federal government as well as provide the external services. A reading of the 1972 report on the subject suggests that internal impediments are recognized as creating most of the delays in service. The remedies envisaged are communications-oriented, and envisage also the use of considerable computer capacity. From this distance it is a little difficult to say whether the Australian experience could be of much help in the particular circumstances in this Department because the report does not deal very much with the records management aspects. For example, the view is taken that if information is properly distributed, its placement by recipients on appropriate files should follow. Filing would apparently be carried out by the Bureaux in their own sub-registries. These aspects, discussed only briefly in the report, will no doubt be dwelt upon in more detail as the project develops. Among other things, a completely new file subject classification is to be established.

157. If material is badly indexed and described, there is less chance of a searcher being fortunate enough to stumble across it in a computer retrieval system than in "hard copy" files. Thus all system developers recognize that high standards of performance and competence are required of indexers/analysts.

158. The State Department rotates indexers between input and retrieval functions, so that retrieval experience can be used to improve indexing decisions. However, the analyst is removed from the user, contact being by telephone, which tends to impersonalize the service rendered. The majority of the indexers are college graduates. Experienced indexers are classified as GS 9 and 11.

159. The EEC have overcome this problem by making the indexer/analyst/retriever part of the directorate which he serves to the extent that if the material is predominantly about agriculture, an agricultural degree is preferred. In this way the system is expected to gain the acceptance of the user and a close relationship and understanding will be developed between the user and the indexer/analyst.

160. The British Foreign Office, though still maintaining a manual system, recognize the importance of indexing and, to ensure reasonable quality of performance, assign those entering at the bottom of the Foreign Service Officer stream to correspondence classification and indexing tasks.

161. The Australians plan to create new personnel classification described as the "Information Handling Group" which would combine and upgrade the Communications Analysts and the Registry Classifiers. They regard this new

group as destined to play a key role in the operation of their system, a conclusion similar to that reached regarding Bureau Information Control Officers in the "Preferred System".

162. If one thing is strikingly evident among all the institutions having problems similar to External Affairs, it is the recognition of the need to make special provision for the employment of high calibre personnel for the key analysis/indexing function.

CHAPTER VII

CONSIDERATIONS IN IMPLEMENTATION OF PREFERRED SYSTEM

163. Once a decision is taken to proceed with detailed planning and the drawing up of specifications certain factors will have to receive critical consideration. Several of these, such as the institution of a new format for drafting telegrams, could have extensive effects outside the information system itself. The following comments can only be indicative rather than definitive because they touch upon matters to be dealt with fully in Phase II.

Financial

164. The initial cost of a new system is likely to be substantial but the return in improved support to Departmental programmes would be significant in comparison with that attainable under the present arrangements. It would be a serious mistake, and perhaps virtually throwing away resources, to try to carry out the new programme on the cheap. It is too early to attempt a credible detailed cost estimate but because of the timing of the financial cycle it was necessary to present a "B" Budget forecast for Fiscal Year 1976/77 before a start had been made on Phase II and even before completion of this report. This is attached as Annex VIII. It shows a projected cost of $408,000 in FY 1976/77 made up of capital costs of $172,000 and personnel and operating expenses of $236,000, including $60,000 for rental of a "mini" computer for development purposes. Some $90,000 additional costs would have to be incurred in the current fiscal year, largely for a microfiche camera and associated equipment in order to start the conversion of some files to microfiche in good time. This would leave to FY 1977/78 the major capital cost of a computer.

165. It must be mentioned that the Treasury Board exercises a responsibility to give approval in principle in advance of any significant electronic data processing (EDP) programmes being embarked upon by Departments. The Treasury Board staff have been made aware of the project through the Department's Annual EDP report submitted in November, 1974, and subsequent informal discussions. This consultative process will have to be carried further in Phase II.

166. At the outset of the project it was not anticipated that Phase I would produce detailed cost estimates because these would, to some degree, be determined by the nature of the implementation plan. The "B" Budget exercise has now focused more attention on the issue of wherewithal. During Phase II a critical path analysis will be drawn up which will help determine more accurately when various major disbursements would have to be made, such as for the early construction of a shielded room and secure links to the CRT's.

Personnel and Organization

167. A decision to initiate a programme based on the "Preferred System" would carry with it a number of implications regarding personnel. It is readily apparent that proposed features of the "Preferred System", encompassing both new functions and upgraded skills, would necessitate a major reorganization of the present Records Management Branch. The approach recognizes two basically different functional aspects:

*concern with the physical handling of material

*concern with the content of material.

The differences in the nature of skills and in the levels of judgment demanded become the basis for organizational groupings, giving managerial spans of control which would be practical, cohesive and effective. Figure 6 depicts the shape of the complete organization, but must be regarded as tentative pending the completion of Phase II.

168. The most important change, which would shape others, would be, of course, the creation of the Bureau Information Control Offices. It is the needs of these Offices which will in part call for an additional eleven man-years, (shown in the FY 1976/77 "B" Budget forecast) which is a quite modest increase when records management manning levels are viewed in the perspective of the rapid growth of Departmental personnel strengths and workload over the past fifteen years (see Figures 1 and 2 on pages 14and 15.) It should, however, be noted that there would be at the same time some twenty-two upward reclassifications within the present manning levels. Some lateral changes resulting from different skill requirements would also be necessary.

169. Figure 6 also shows a new position, that of Director of Information Systems, which would without doubt be the key position and person in the whole system. Momentum generated and maintained by this individual would determine the extent to which the Department would be able to enjoy the benefits potentially available in the system. The first incumbent would preferably be an FS since there would be a need to understand and develop the system from the point of view of those associated with the substantive programmes of the Department. Furthermore, early development work relating to Level III and IV activities would require professional FS knowledge, both to see the possibilities and to translate them into action acceptable to the users.

170. Figure 6 makes provision for the Central Information Control Office and the computer and other special equipment operations. The overall breadth, scope and functions of the organization would have to be considerably augmented, -- partly as a result of the introduction of Level III and IV activities -- but several large components of the present system, such as the Mail Room, would be left much as they are or only augmented to some degree.

171. All the evidence within the Department as well as in a number of other institutions makes it clear that the Bureau Information Control Officers would have to function in a quasi-professional manner and that their span of skills would have to be much broader than that required of the CR group. This aspect has already been dwelt upon at some length. The reclassification process would have to start early in order that recruitment and staffing could be carried out in time to provide the right people when needed. Some of them may be found in the Department but the probability is that a number would have to be recruited from outside. This would almost certainly apply to those needed to work with the computer itself but training to upgrade the skills of some of those now in the Registry could open opportunities for them to operate microfilm cameras, processing and other equipment. Except as indicated below the Bureau Information Control Officers and other operating personnel should all be recruited to fill non-rotational positions as has been emphasized elsewhere in this report.

172. At present the rotational pool of CR's provides the majority of those in the analyst/classifier section. This function would be shifted to the Bureau Information Control Officers which could cause some strain for the operation of the rotational pool if there were no off-setting effects. Fortunately, several aspects of the "Preferred System" would come together to eliminate this problem. Obviously some of the clerical filing functions now performed in the

External Affairs Canada / Affaires extérieures Canada

ORGANIZATION CHART – ORGANIGRAMME

Reports To-No/*Relevé de nº*: Director-General Communications & General Services

Title/*Titre*:

Effective Date/*Date d'entrée en vigueur*:

Branch/*Direction* – Post/*Mission*: Information Systems Division

Chart Title/*Titre de l'organigramme*:

Page / of/*de* / Pages

Approved By/*Approuvé par*:

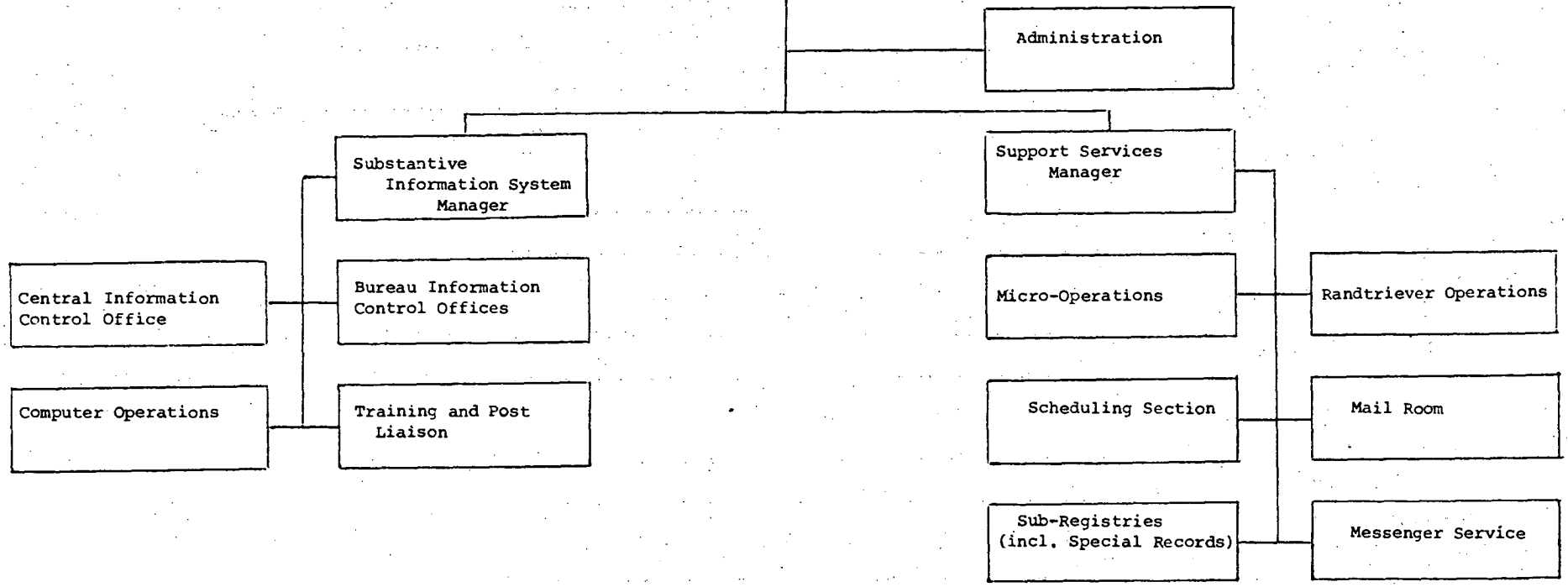


FIGURE 6

Central Registry would be transferred to providing support to the Bureau Information Control Officers. Moreover, the Records Management Division has some difficulty in the present organization in providing adequate training for CR's proceeding abroad where their duties include management of post registries. The Bureau Information Control Offices would provide a much more realistic training ground for such CR's than is possible within the present centralized system. This could, in fact, lead to a possible reduction in the training component being envisaged for the present Registry.

173. The whole process of bringing about the necessary personnel changes will clearly take some time. In order to tackle the issues effectively in Phase II, and since the reclassification exercise in particular would be quite extensive, it would appear essential to assign a knowledgeable classification officer from the Personnel Planning and Development Division to work with the project team for a few weeks. With regard to the time factor in relation to recruitment plans it would also be important to consider the full impact of the requirements for bilingual qualifications for certain of the positions to be filled.

The Public Archives

174. The "Preferred System" envisages the combination of computer indexing with extensive use of micrographic techniques, most probably with heavy reliance on microfiche. Although it is not now planned to do away with "hard copy" records certain lines of future development could possibly lead in this direction. In any event, given the large amount of External Affairs material being continuously transferred to the Public Archives (now accumulated to some 100,000 files), and since micrographic records will be created in the Department, the question of ensuring their acceptability in one or another form should be discussed with the Dominion Archivist. Apart from the question of acceptability to the Archives, there is also a requirement that any Department embarking on a microfilm programme must consult the Micrographic Evaluation and Development and Micrographic Advisory Sections of the Technical Division of the Public Archives. The Technical Division can also provide valuable operational assistance in the carrying out of any micro-filming programme.

Security

175. It has been established by the Security Advisory Committee that certain procedures must be followed in initiating and operating departmental electronic data processing programmes. Preliminary study suggests that there is no reason to believe that the required procedures will pose any insurmountable obstacles to implementing the "Preferred System". It is clear that any extensive system in this Department handling classified material will have to be housed in the L.B. Pearson Building. It follows that early steps will have to be taken to provide shielded premises for the computer and secure links to the CRT's. To avoid unacceptable delays it may well prove essential to provide funds and to carry out the construction work in the current fiscal year (1975/66).

176. Physical access to the computer, to other specialized equipment and to files and micrographic records would presumably be governed by the same rules and precautions as now apply generally to Departmental operations. In particular, proper "charge-out" rules would have to be promulgated for handling the proposed microfiche copies held under the jurisdiction of the Bureau Information Control Officers. The question of access to the information in computer storage also arises. A considerable amount of development has been applied to this aspect of computer operations both within government and in the private sector. In

principle only those with a "need for access" would be given the necessary coded keys for operation of the computer terminals. While authorized personnel would be able to gain rapid access to a large body of information it is also true that the computer imposes certain impediments to the unauthorized or accidental disclosure of information.

Bilingualism

177. The Department has reached the stage in the implementation of the Government's official language policy where all communications may be drafted in either English or French strictly according to the choice of the originator. This means that the indexing and retrieval procedures will have to accommodate to both languages. Certain practical considerations arise in that between eighty and ninety per cent of Departmental communications are in English. In these circumstances it is not yet clear what technical approach to use of the computer out of several possibilities would yield the best results. This problem will have to be examined carefully in Phase II in conjunction with consideration of the best way to develop a suitable thesaurus.

178. In another direction, the reorganization and recruitment programme so essential to the introduction of the "Preferred System" will have to take account of the way in which the personnel policies of the Department are fulfilling the requirements with respect to bilingualism.

Involvement of Posts

179. The "Preferred System" has been designed specifically to deal with the requirements of the Departmental headquarters. However, a thorough systems approach to the problem has resulted in the identification of several aspects of post operations as being relevant to the larger picture:

a) The Form of Communications from Posts

180. From time to time efforts have been made to restrict the length and number of telegrams with the objective of reducing costs, or of reducing the load on the system to accommodate the handling of crises of various kinds or of union "go slow" tactics. The current study has not been addressed to diminishing these burdens and is based on the assumption that whatever happens, telegrams will continue to increase in number, both in absolute terms and as a proportion of Departmental communications. The installation of message switches in Ottawa and London, and the introduction of [redacted] cypher equipment, will only accelerate the process, whether or not the Department must inevitably obey a sort of Parkinsonian law to the effect that telegram traffic will always rise inexorably to absorb all available capacity.

181. Some automated storage and retrieval systems require the analysts to write abstracts or summaries of the documents to be stored. This approach is particularly applicable to scientific papers. It does not lend itself easily to handling a flow of daily communications and was rejected after being tested in an experiment conducted in the Swiss Foreign Office. Nevertheless, the POPSUM operation and other higher-level needs in the Department, as discussed in Chapter V, are of sufficient importance to justify examining whether changes in the form and content of telegrams could yield worthwhile benefits.

182. To start with, much more vigorous adherence to the long-standing rule of "one subject -- one message" should be practised. There is, of course, a place for the "tour d'horizon" or the report of a discussion with some important personage which touches upon several matters on the one occasion. But there is an unfortunate tendency on the part of some authors to treat with disparate subjects in the one telegram without making clear the theme linking the various aspects in a manner to enable the document to be placed in a suitable subject file. Limitation of subject matter would shorten some telegrams, making them easier to classify and index, but would perhaps increase the number of separate telegrams.

183. Mention should be made here of the procedure instituted some years ago whereby the originators of messages abroad direct them to the "Action" and other addressees by three or four letter designations. There were some misgivings when this procedure was introduced but it has worked remarkably well. To meet the same objective, the United States State Department (and the C.I.A. as well) employ a corps of "disseminators" who make a quick analysis of incoming material to determine the complete list of addressees, every incoming communication being addressed only to the Secretary of State. In this the disseminators are assisted by the TAGS procedure (Traffic Analysis by Geography and Subject), established in March, 1973, which is set forth in a 27-page book laying down a rather complex set of rules to be followed by posts and headquarters. Both the External Affairs addressee procedure and the State Department TAGS in effect provide the first "cut" at subject classification while bringing the material to the desk of the action officer.

184. Looking beyond the "addressee" lines, analysis of material in the Kard-veyer and of the daily telegram "pack" of substantive communications shows that in a significant proportion of telegrams the introductory material is either of only ephemeral interest (e.g. "I spoke to "X" after dinner last night") or of a trivial nature leading up to the real substance in later paragraphs. One idea that has been put forward to overcome this shortcoming is that all telegrams of two pages or more should be accompanied by a summary. This would transfer part of the function of analysis and classification to the originators in a similar way to the earlier step of requiring designation of specific addressees by unit or division.

185. The existence of good summaries of telegrams would undoubtedly provide several benefits. For example, the production of POPSUM would be largely simplified into a rapid selection process. More importantly, the Under-Secretarial Group (and others as appropriate) could be provided with a quick means of scanning the titles and summaries of the telegram "pack" on CRT viewing screens. This is dealt with more fully in paragraphs 110 - 112 in Chapter V on Level III and IV activities. Even in the absence of EDP techniques all information and distribution addressees of telegrams would find their reading tasks considerably eased. And finally, the Bureau Information Control Officers would gain much help for their subject classification and indexing tasks.

186. Despite all the benefits the writing of summaries would also carry some drawbacks. The writing of summaries would impose a burden on authors who would often be working under pressure and hence would skimp on effort for the summaries. In the case of shorter telegrams, the summary might seem pointless and would be omitted. The summaries would, of course, add to the total volume

of communications traffic and costs. The obligation to write a summary would tend to lead to the wasteful effort of redrafting the telegram to place the summary at the beginning when often the telegram could be sent as originally dictated. This objection could be overcome by placing the summary at the end of the text but it would then be less useful to readers.

187. This leads to the concept of introducing a somewhat different discipline in telegram drafting. Firstly, more care should be put into subject headings. Trick or clever headlines such as sometimes appear in newspapers should be carefully avoided. On the whole, the heading should be such as to give a general pointer to the subject file. Secondly, taking a leaf out of the instructions for preparation of a Memorandum for the Minister, the first brief sentence of the text should be a terse statement of the "purpose" of the telegram. This could be combined with or followed by a sentence or two at most containing the classic elements of the lead paragraph of the standard newspaper story, that is, the answers to the so-called "Five W's" series of questions, "Who?", "What?", "Where?", "Why?" and "When?". This lead paragraph could be limited to, say, seven lines, but unlike the summary would be an integral part of the message. Its construction would tend to impose a certain beneficial discipline on originators in that all that followed would generally be of lesser importance. This could lead to a trend to somewhat shorter telegrams than is at present the case where many drafters prefer the more normal form of composition by building up to conclusions at the end. Time and conditioning of personnel would be necessary to translate these ideas into practice. This matter will be tackled again in Phase II but it can already be said that the posts should expect to become much involved in contributing to the success of the new system through conforming to certain rules in the drafting of their communications.

b) The Post Registries

188. The present centralized mode of operations in the Records Management Division cannot give general filing experience comparable to that found in posts. In the Bureau Information Control Offices the "Preferred System" would provide an ideal training ground for CR's being posted abroad to perform predominantly registry functions.

189. Ideally, CR's would serve in the Bureau Office covering the area to which they were to be posted, or at least spend a familiarization period in such Office. This would take advantage of the fact that the retention of the Records Classification Guide provides a common subject file structure at headquarters and at posts abroad. The geographical Bureau offices, as well as functional Bureau offices in some cases would also have a responsibility to give support and guidance regarding registry operation in the posts with which they were associated. Among other duties they would provide the first-line monitor on post records destruction programmes, including implementing procedures for guarding against loss of important documents where duplicates did not exist in Ottawa.

c) Microfiche

190. The proposed employment of microfiche in the "Preferred System" opens up a number of possibilities for application at posts. Good standard-size microfiche viewers cost as little as $150, and briefcase-size viewers about $75.00. For example, the presence of a microfiche camera and processing unit in Ottawa could make possible the economic conversion of the many administrative manuals to microfiche for ease of transmission abroad. This has already

been discussed in a tentative way. Practical procedures can be envisaged to deal with the problems of amendments and to ensure adequate access at posts.

191. Under the "Preferred System" sets of key documents and policy statements, as well as country data, are likely to be assembled on Microfiche. These would provide an ideal way to transmit selected relevant material to posts where control, storage and, on occasion, destruction would be greatly simplified. The possible conversion in Ottawa of institutional documents, (e.g. UN Specialized Agencies, NATO, GATT) to microfiche would make it possible for large amounts of such material to be held abroad with minimal strain on space. Such collections and the presence of the post viewer, or of a portable viewer, would be a great asset to delegations attending conferences, and of particular value for conferences held away from the headquarters of the institution concerned. The adoption of the microfiche technique in the Department would make it desirable to encourage international institutions to follow the same route. At present NATO does not appear inclined to do so but there is some thought being given to these problems within the U.N. family. If this were done the task of some of our posts of transmitting vast amounts of material to Ottawa could be considerably eased, and courier and airmail expenses substantially reduced.

Computer Usage Priorities

192. Existing computers in the Department have been installed to handle very specific tasks, such as the Passport and message switch computers. As a result there have been no conflicts regarding usage by other Divisions. The implementation of an information system catering to all four levels of need could alter this pattern. Such a prospect arises because the nature of the proposed system could result in the successful bid for equipment featuring a medium-scale general-purpose computer.

193. While accepting the demands of the substantive information system as the primary justification for the equipment to be installed, Treasury Board might well require a long-term rationalization of computer use within the Department. For example, some of the so-called "Independent Systems" identified in paragraphs 57 to 60 might be directed to share the use of the computer, and existing systems now run on outside machines might be pulled back in-house, to achieve some savings. Such an approach is indeed to be expected but it would bring with it a number of problems which have been experienced by most computer centres, and which should be identified and faced now.

194. As diverse systems from separate divisions of an organization are added to the workload of the same machine a jurisdictional problem arises as to responsibility for the machine itself. Frequently the solution for this has been to create a special computer systems division which reports to the head of either the financial or administrative branches. In profit-oriented organizations this has worked in the past, although the financial control aspects inherent in the management viewpoint found in these groups has sometimes inhibited beneficial systems growth in other operational areas. Current trends recognize the nature and importance of information systems and computer tools resulting in the creation of a Vice-President or Director-General of Information Systems. Although the scale of operations in the Department does not warrant completely embracing this latter approach, the concept is one which appears desirable to apply to some extent at least in the early stages of development of the "Preferred System".

195. Acceptance of this approach, however, carries with it the implicit assumption that the substantive information operations will have highest overriding priority rights on the computer system. This is as should be, considering the basic reason for the introduction of the machine in the first place, and the fact that the substantive information system would have to give fully available daily support to the Departmental programmes with an impact in all Bureaux. The complete responsibility for all aspects of the system, including "hardware", during developmental phases would enable coherent managerial decisions to be made. The Director of Information Systems would need to lean heavily on technical expertise both within the Department and outside in the early stages but of critical importance to the acceptance and success of the system would be the skills and experience in the foreign affairs field which he would bring to bear.

196. Once the system had found its feet, the non-substantive systems could be accommodated. Should conflicts arise regarding the timing of work to be handled by the computer system, or capacity problems result in a degradation of performance to all users when those outside the substantive information system make demands upon the machine's resources, the requirements of the substantive system should prevail. If necessary, additional capacity should be obtained to ensure adequate performance for all.

197. The priority question might actually turn out to be a minor problem for non-substantive users in that for on-line operations, taking a lower priority behind substantive users might not result in noticeable degradation of response, or at worst a wait of a matter of minutes. For "batch" tasks overnight or 'background' scheduling (i.e. the "batch" programme using machine resources only when no on-line demands are being made) could be used, since "batch" tasks usually have less critical response requirements than those employing the on-line approach to the computer.

Space Requirements and Physical Plant

198. The introduction of automated equipment and the establishment of Bureau Information Control Offices would bring about a number of changes both at the present Central Registry location and on the Bureaux floors. The details would have to be worked out in Phase II but it is now possible to say with some confidence that the changes should create no insurmountable difficulties about finding accommodation within the resources of the Building, and without disturbing other units. The major new construction would be the TEMPEST shielded room and secure links to the CRT terminals at Bureaux sites. Shifting some files to Bureaux offices and others into the Randtriever, and elimination of the analysts' and Kard-veyer operations on the ground floor, should make it possible to accommodate the computer, Central Information Control Office and microfilming operations. On the Bureau floors there is much under-utilized space at the "ports" of the conveyor system which in most cases would be adequate for the Bureau Information Control Offices.

199. As to existing equipment, it is envisaged that the Randtriever would be retained but that the Kard-veyer would be eliminated. Since the expensive mechanical Conveyor serving the Bureaux in the various towers would continue to be an important component of the system, a special effort should be made to ensure reliable mechanical performance, and operating procedures should be streamlined and kept under tight control to avoid accumulation of delays in delivery time.

CHAPTER VIII

PHASE II AND THE IMPLEMENTATION PLAN

General Considerations

200. The main tasks in Phase II will be to provide an implementation plan and to work out the detailed specifications required to make it effective.

201. It will be a complex managerial task to implement a system which will directly alter the jobs of some one-hundred and forty people, affect hundreds of other employees in the Department and take over two years to become fully operational. The process will also involve the introduction of advanced techniques and technologies and the need to obtain external approvals from Treasury Board and others. It would be premature to attempt to provide much detail but a tentative plan has been depicted in a somewhat sparse manner in Figure 7 as the basis for the work to be done in Phase II.

202. Figure 7 implies that a coherent orderly approach will be taken from the initiation of action until a stable system is in full operation. Attempts to make selective improvements rather than a complete and radical change should be avoided. The systems approach recommended in this report links each component to the whole, and it is only within the whole that the full benefits can be derived from any one element. This means that from now on no substantial changes should be made in the Records Management Division without considering their effect on the implementation plan for the "Preferred System".

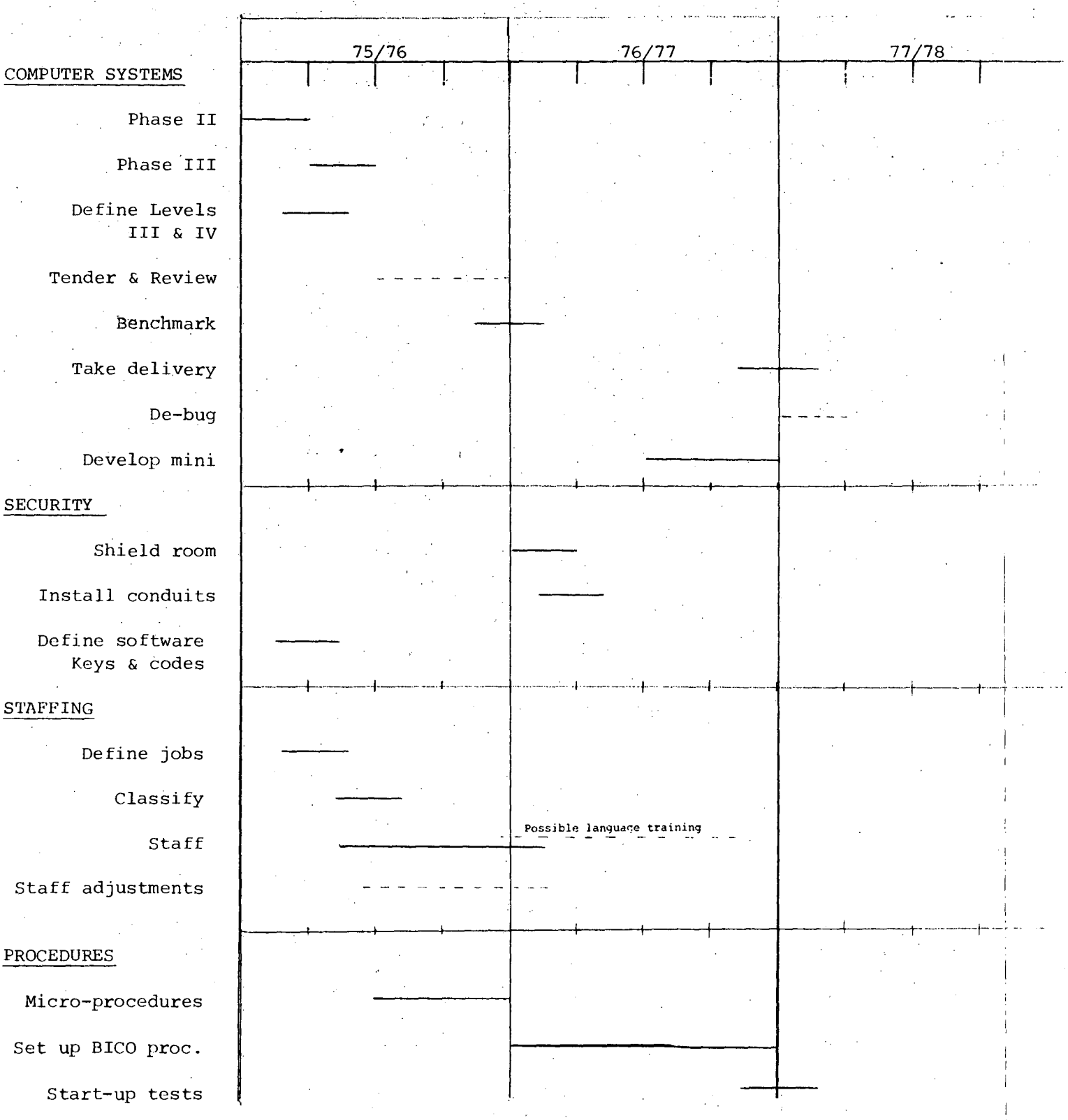
The Implementation Plan

203. It would be unrealistic to expect that an immediate start on the development of the system could result in a completely operational system in anything less than two years. Even with ideal conditions of short delivery times, early staffing successes and immediate resource and budget availability this period could not be reduced below eighteen months. The time for the interaction of the various elements, particularly the partially non-controllable aspects such as delivery and outside approvals, suggests the two-year span as being the much more reasonable target. The critical items which together govern this time-scale are the computer system "hardware" and "software" definition and set-up activities, and the staffing and training processes.

The Computer System

204. Those activities related to the computer system and "software" should follow technical procedures which are now well established. Phase II should incorporate the necessary steps in the preparation of general specifications for the system (defining procedures, flows, manpower needs and so on) and more detailed specifications for the more technical components, followed by Treasury Board approvals and the invitations to tender. A three to six-month period could then elapse. Selection of any system proposal submitted would not rest on price alone, but would take into account other factors such as flexibility to handle future growth and capacity to handle loads with little or no degradation of performance. Proposed systems to meet Departmental requirements might vary widely as between suppliers and render the evaluation process difficult. Because of the size of the system in terms of numbers of terminals and volume of files, testing the suppliers' claims for performance ('bench-marking')

FIGURE 7



IMPLEMENTATION PLAN

would require a heavy involvement of time in the development of either simulated files and simulation programmes (from general purpose packages) or randomly-generated files to which access would be tested by twenty to thirty terminals simultaneously. Delivery time for equipment and "software" could vary anywhere between three and nine months. Following delivery there would have to be an acceptance period during which the machine would have to prove in practice what its suppliers had claimed in theory.

205. To ensure that the time of waiting for delivery would not be lost in inactivity, it is proposed to rent a "mini" computer to fulfill three purposes:

* To capture information in closed volumes of files which would form the basis for indexes for transfer to the future system.

* To train and familiarize the analyst/indexers with the CRT techniques in preparation for live-testing the system upon delivery. Inadequately-prepared analyst/indexers would result in an inability to make a realistic test of the system prior to acceptance.

* To conduct developmental and experimental work for one of the Level III and IV systems, probably the telegram display system.

Security

206. Security aspects have already been discussed but the matter of timing must now be considered. Before any equipment deliveries could be made the physical security features would have to be in place. To avoid any danger of labour or material problems delaying the computer delivery date and stranding the staff and procedures, the shielded room and links to the CRTs should by preference be installed in FY 1975/76, but budgetary constraints may require this work to be scheduled for the beginning of 1976/77. During that year the "software" devices to control access to the computer would also have to be established.

Staffing

207. The fundamental changes in the approach to information storage and retrieval in the Department foreshadowed in this report would have major effects on people. New skills would be required, new tasks would be created and different combinations of tasks would emerge. In staffing terms this means that a new reclassification exercise would have to be conducted in the Records Management Division. The Personnel Bureau has been approached with a request for assistance in this area. Since reclassification of the positions would be the first of a number of steps before any personnel could make their appearance as fully operational members of the organization, it would be essential for the process to begin immediately.

208. The staffing phase would be one of the most critical of the whole project, and one where response and success would not be wholly within the control of the Director of Information Systems. Furthermore, the lead time before a successful candidate could take up his duties would vary, especially if a language training period should be required. The whole staffing activity

must be closely linked with the computer system development and delivery. In order to have staff in place and trained to make use of the equipment when it arrives, and to make the procedures function, a start should be made during Phase II.

209. It must be assumed that the Bureau Information Control Officers will make their appearances over a period of time. In accepting job offers they would have a concept of what was expected of them and the level of challenge in the job. To prevent waste of personnel resources and perhaps attrition from lack of action these indexer/analysts should be introduced to the new procedures on a "mini" computer so that they would themselves participate in the development of the system while being trained to operate it. By the time the main computer system arrives, these key people would be ready to function at close to the level required, having at the same time captured a significant amount of data for the initial files of the system.

210. There are of course a number of people in the present system who would continue to carry out their old or similar tasks very much as before. Others would be offered the opportunity to acquire new skills to perform functions which currently do not exist. Through the normal process of attrition and rotation others not suitable to the new programme would leave, or be induced to leave, the Records Management Division.

Transitional Measures

211. Apart from the technical, organizational and staffing considerations described above, the transitional measures necessary to put the system into operation would be equally critical. Since changeovers consisting of the "throwing of a switch" are rare, there would be a need for judicious management of resources during the transition period, experience having shown that there frequently is a need for duplication of effort until former procedures can be safely dropped.

212. Looming large as a problem is the conversion of a certain amount of the closed files to microfiche. Without this depth of information there would be less purpose in users turning to the system, and procedures for retrieval would become very complex in the first few years if too much of the former media were still required to satisfy requests. Thus, the purchase (or lease) of microfiche equipment and the creation of the fiche files and indexes would be required well before the arrival of the computer. The Bureau Information Control Offices would most probably be set up one at a time to minimize difficulties created by unforeseen problems, but would all have to be in place ready for training on the "mini" computer system. Since this would involve movement of files and individual items through the Conveyor system, and would be a complete change from existing procedures, the many temporary problems this would inevitably create would have to be solved before the computer system was installed.

Phase II Programme

213. Attached as Annex IX is a draft of a proposed agreement with the Bureau of Management Consulting to cover consultant services required for Phase II. It will be seen that the work plan is largely concerned with various aspects of the implementation plan sketched above. It is perhaps convenient to group the Phase II activities into several categories as follows:

a) Personnel matters -

reclassification, organization, recruitment, training -

To deal with these matters effectively an officer should be attached temporarily to the project from the Personnel Planning and Development Division and the future Director of Information Systems Development should take up his assignment as soon as possible.

b) External Approvals -

These should be obtained from Treasury Board, the Public Archives and the Security Advisory Committee.

c) Security -

Specifications to be established for computer room shielding and CRT links.

d) Computer Systems -

A senior officer should be attached from Management Services Division to assist in the detailed analysis of computer system options and to become fully familiar with the overall system in preparation of the subsequent stage involving dealing with equipment suppliers.

e) Computer Indexing -

An intensive study must be made to determine the technique most appropriate to External Affairs material and how best to create an appropriate thesaurus.

f) Micrographics -

Equipment, techniques and costs would be explored in detail regarding -

Microfiche and microfilm
Cameras and film processors - fiche duplicators
Viewers and reader/printers
COM

g) Videographics would be examined to determine whether this technique might be advantageous in connection with Level III and IV activities.

h) Word processing -

OCR and "power typewriters" would be examined with particular reference to Level III and IV activities.

i) The requirements of units employing "Satellite Systems" should be examined in depth.

j) Telegrams -

Development of an improved format would be pursued.

k) A Departmental Information Systems Development Committee should be formed to facilitate the orderly introduction of the new systems.

l) A "critical path" analysis would be established for the implementation plan

214. It was earlier mentioned that Phase I had come to include some work properly forming a part of Phase II. To a certain extent this has contributed to the inclusion in the plan for Phase II much of what would have been carried out in Phase III. However, the various elements proposed for treatment in Phase II do fall into a logical and coherent work package, and in fact several aspects would be proceeded with concurrently. It is appreciated that apart from the critical question of personnel, the dominating issue to be settled would be the nature of the computer and indexing systems to be adopted since these would clearly have considerable effects on the overall programme. Senior management will also at this stage wish to consider the question of financial resources. By submitting a "B" Budget forecast for FY 1976/77 calling for substantial preparatory expenditures management has in effect made a decision in principle which would lead to the purchase of the computer in FY 1977/78. It would therefore seem desirable to present recommendations for final decision by senior management at the point prior to the drawing up of detailed specifications for the computer "hardware" and "software". Several other recommendations or lesser features of the system might have matured sufficiently for consideration at the same time. The middle of June would seem to be an appropriate target date for these matters to be brought to a head.

ANNEXES

HISTORY OF RECORDS MANAGEMENT IN THE DEPARTMENT

Prior to 1940 a new series of files was started each year. There was no subject classification system and files were numbered sequentially as they were opened, although some attempt was made to carry over file numbers from year to year. In 1940, the practice of starting a new series each year was discontinued because of the work involved in making up new files. Nevertheless it became increasingly difficult to locate particular subjects in the ever-expanding file lists.

It was the practice, even prior to 1940, to index substantive correspondence. The quality and depth of indexing fluctuated in accordance with the availability and capabilities of personnel assigned to this task. When the present subject classification system was introduced in 1963, indexing was reduced because it was felt that satisfactory retrieval could be accomplished through the classification system with some assistance from source indexes alone. However, experience soon demonstrated the need for indexing in greater depth.

Chronologically since 1940 the following changes have been made:

- In 1948 sub-registries were established to service individual divisions. Eventually there were sixteen of them.

- In 1951 sub-registries in each building were combined but the organization of the registries and filing practices continued on a divisional basis.

- The present file classification system was introduced in 1963.

- In 1971 an alphabetical listing of key words (KWOC - Key Word Out of Context) in the 1940-63 series was developed, using computer listing techniques. While the KWOC index is used occasionally, the original indexes have proven to be the more useful tool for retrieving information.

- In 1973 the Department moved into its new headquarters building and files were consolidated in one area, with the exception of files on personnel, finance and administration. At the same time the Records Management Division was provided with some new equipment, notably the Randtriever.

- In 1975 files used by the Consular Bureau were moved to an area close by to provide more effective service.

A number of studies have been carried out in the post-World War II period. The first of these, started in 1950, resulted in the Dench report of January, 1954. This report recommended major organizational changes, more non-rotational staff, improved status for the Registry and the development of a file classification system. No significant action was taken as a result of the Dench report. In subsequent years the following studies dealt with records management matters:

- The Glassco report of 1961 concentrated on the lack of a file classification system, and mentioned that the "Registrar, realizing that operations are inefficient, has repeatedly drawn attention to the need for a new file classification plan and other changes. Unfortunately, no action has been taken".

- In February, 1962, a report on "The Organization and Operations of the Departmental Registry" was submitted to the Under Secretary by Mr. A.J. Andrews. This report discussed the Dench report of 1954 and in general agreed with its recommendations, proposed changes in procedures, organization, and promoted the development of a file classification system. The Andrews report was not favourable to the concept of non-rotational staff. Some procedural changes were introduced and some reorganization took place.

- As a result of the Glassco and Andrews reports, a task group, headed by Mr. J.C.G. Brown, and using the U.S. State Department's file classification as a guide, developed and introduced the present file classification system in 1963. Mr. R. Charette was a member of that task group and was appointed head of Registry at that time.

- The consulting firm of Urwick-Currie carried out a study of the Department's administration activities, including the Registry operations, in 1964. Recommendations for reorganization, the need for longer assignments to the Registry (or non-rotational staffing) were made, as well as for procedural changes in many areas. The complexity of the file classification system was commented upon and it was recommended that the proposed O and M Unit should carry out a more detailed review of the Registry operations.

- The O and M Unit carried out a study of the Registry in 1966 and circulated a report in draft to all user divisions. Comments in general were favourable and a task group was formed to work out details of organization, staffing and procedures. The final report was made in 1967 and recommeded a pilot project to test the proposed system. There was no further action taken until 1972.

- A Records System Action Group was set up in 1972 to review the whole area of records management and they recommended a project be carried out to test the system as proposed in the O and M report of 1967. This project resulted in the O and M report on CORE (Communication Retrieval) and served to point up the need for well-trained staff and good planning before adopting the proposed system. Included in the report were productivity figures on various operations in the system.

ANNEX II

Q U E S T I O N N A I R E

BACKGROUND

Present - BUREAU: DIVISION:

Previous -

Name: _____ Level: _____

Years of service: In Ottawa _____ At this Assignment: _____ Total _____

1. Do you have your own working files? Yes _____ No _____

   Why -

   If no working files are kept, skip to Question 10

2. How frequently do your working files, divisional/bureau telegram copies and diary copies meet your

   - day-to-day needs _____%

   - needs for events (crises) _____%

3. What is the volume of your working files (by feet of used drawer space)

   _____

4. How are they organized

   - by departmental Records Classification Guide _____

   - by your own subject classification _____

   - by event _____

   - chronologically only _____

   - other _____

5. What percentage of time do you spend filing and organizing your working files _____%

6. What criteria do you apply in the selection of papers for your working files.

7. a) Do you weed papers out on a regular basis _____

   b) What criteria do you use for weeding _____

8. Who, besides yourself, uses your working files.

9. How far back do your working files reach.

10. Were the papers left behind by your predecessor

    a) relevant _____

    b) arranged to suit your needs _____

11. Did you make use of them _____

12. What did you expect from your predecessors' files on taking up this post.

13. In general, do you have confidence in the ability of the registry to find and deliver, within the time required, papers you need in your day-to-day operations

14. If yes, what additional advantages are there to be gained from working files beyond the mere retrieval of specific information.

15. If registry services were wholly adequate

    a) would this affect the length of time you retain registry files

       (How long do you presently retain registry files on the average?)

    b) should officers still retain working files

    c) could working files be discontinued but copies of some key papers still be retained

16. a) Do you assign file numbers to correspondence which you originate

    b) Where do you obtain the file number

17. a) Do you feel that the Records Classification Guide meets department requirements

b) Do you think that the Guide is being applied properly

c) Do you feel that correspondence is being properly classified for filing

d) Do you frequently disagree with respect to the classification of a subject or of particular communications

18. a) How do you formulate a request to Registry -

by File No.	By subject & by date or approx. date	By Subject	By telegram, document, etc. No. and/or date
%	%	%	%

b) How do you direct a request to Registry

19. a) Has the response time from Registry been satisfactory with respect to your various requirements, ranging from immediate to several days

b) What per cent of the time has the material provided by Registry met with your complete satisfaction at first response

20. How often does a problem require access to information in written form

- in under one hour _____%
- in less than half a day _____%
- within 24 hours _____%
- within two days _____%
- within a week _____%
- over a week _____%

21. a) In seeking information from any source for a specific problem, how often do you need to go back

Up to 1 month %	Up to 6 months %	Up to 1 year %	Up to 2 yrs. %	Up to 5 years %	More than five yrs. %

21. b) Do you frequently feel that you should have gone further back into the files?

c) If yes: why didn't you

22. Of the material received in the course of your work, in what proportion

are you the office of prime responsibility
is it just for information

23. a) What per cent of your time is spent in reading "for information" departmental communications

b) Is volume of such communications

too little _____ Too much _____ about right _____

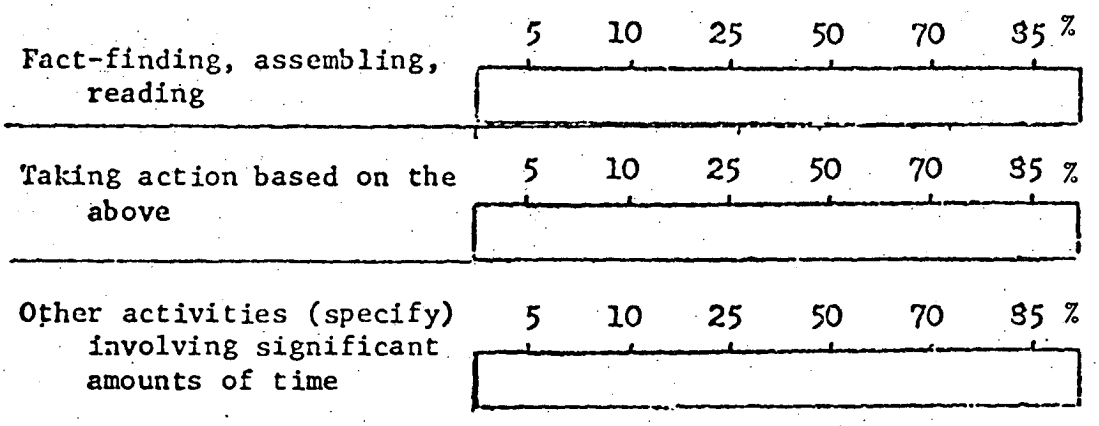
c) In relation to your present responsibilities what per cent of such communication is

useful _____ irrelevant _____ too broad _____

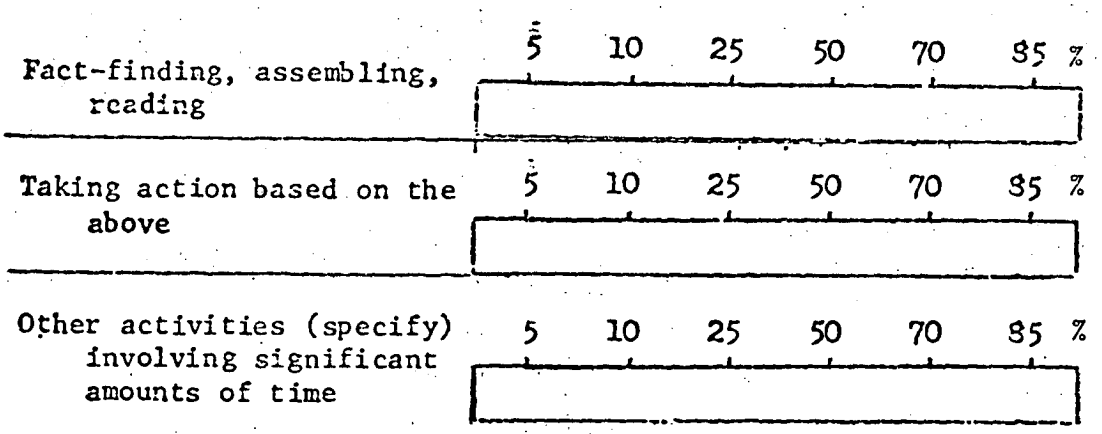
24. How frequently do you use the following sources of information

	Frequency (per day or per week, per month, etc.)
Registry files	
Public Archives (Tunney's Pasture)	

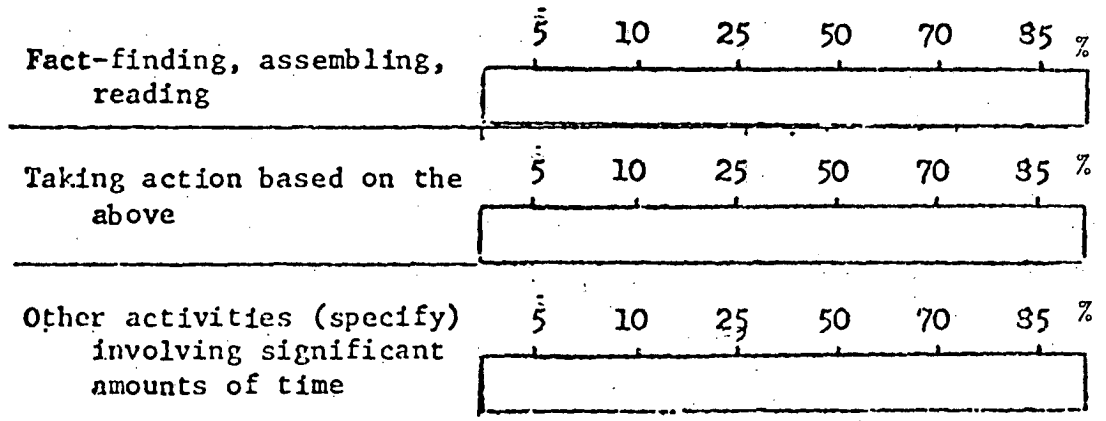
b) During regular or normal conditions



c) During event or crises situations



d) Prior to the end of an assignment



24. cont'd.

	Frequency (per day or per week or per month, etc.)
divisional/bureau copies of telegrams	
working files	
diary copies	

25. What do you consider to be the six most important sources of information -

Directly related to your present responsibilities	Peripheral to your present responsibilities	Professional Development
Source	Source	Source

26. Is the flow of information in the department adequate to meet your needs with respect to matters indirectly relating to your present responsibilities or for your professional development

27 a) Indicate the proportion of time spent for the following activities during the breaking-in period of a new assignment

	5	10	25	50	70	85	%
Fact-finding, assembling, reading							
Taking action based on the above							
Other activities (specify) involving significant amounts of time							

28. Of the number of occurrences requiring information, what per cent are

	% Frequency	Where do you look first	Next
i) in reaction to specific events/subjects			
ii) to become familiar with new responsibilities			
iii) for regular browsing related to your desk and to increase general knowledge			

29. In view of foreign service rotation, on arrival at a new assignment, would it have been of value to have

- historical backgrounds
- updated basic data
- updated situation reports
- analysis of principal Canadian interests
- Canadian policy position
- annotated bibliography of unclassified and departmental material

30. a) What do you consider to be the main purpose of your work.

b) What are the most important products of your work.

31. What do you propose should be done

a) to bring about immediate improvement in the handling of information in the department

b) for the long-term development of departmental information systems.

RECORDS MANAGEMENT DIVISION -- STRUCTURE AND PROCEDURES

ORGANIZATION

1. The Division is organized along functional lines with seven sections reporting to the Director.

- Mail Section - sixteen man-years, handles incoming and outgoing mail.
- Records Services - forty-one man-years - file classification, indexing, microfilming and retrieval of papers.
- Systems Development - eight man-years - systems improvement, file classification and index control, training and post liaison.
- Records Scheduling and file depository - sixteen man-years - file scheduling, custody of dormant and active files and operation of Randtrievers.
- Messenger Services - forty man-years - outside messenger services and internal messenger services including manning of conveyor stations.
- Finanical and Administration - two man-years - budget matters and divisional statistics.
- Typing Services - four man-years.

An organization chart is appended to this Annex.

2. Since 1960, the Department has doubled its strength from a staff of 1361, including 315 foreign service officers, to its present strength of 2854 with 751 officers. The numbers of personnel assigned to records management, however, has not kept pace with the growth of the department and the increase in workload. The following table illustrates these relationships.

	DEPARTMENT		RECORDS MANAGEMENT DIVISION			
			Manning Level		Average	
Year	Total Staff	Officers	Total	Messengers	Actual Strength (Note 1)	Papers Processed
1960	1,361	315	84	17	64	325,000 (estimate)
1967	2,005	442	106	25	68	
1969	2,278	486	104	24	69	445,000
1970	2,363	510	104	25	61	537,000
1974	2,854	751	115 + 13 (Note 2)	40	70	730,000

Note 1: Not including messengers
Note 2: Transferred from Mail Room hitherto part of Telecommunications Division.

3. It is apparent that Records Management Division has been continuously below the authorized strength manning level. In recent years there has been some increase in the number of positions designated as non-rotational but of the 75 positions (128 less 53 messengers and mail room staff) assigned to the management of records, 37 are still designated as rotational.

Equipment

4. An automatic conveyor system to deliver material throughout the building and a pneumatic tube system in Tower A were installed during the construction of the new headquarters building. At the same time the Randtriever file storage facility and Kard-veyers to hold index cards were purchased. The cost of these specialized items of equipment was roughly $750,000. In addition to normal office furniture and equipment including filing cabinets, the division has a variety of items for specific purposes. Among these are powered sorting bins (Lektriever), a plastic protective packaging device (L-Sealer and "shrink tunnel"), a microfilm reader and nine vehicles.

Space

5. Records Management Division occupies 18,000 square feet of space on the Ground Floor of Tower A and 3,000 square feet on the 2nd Floor of Tower C. In addition, conveyor rooms on floors occupied by the Department in Tower A, B and C are also utilized in a limited way by the Division. The total space occupied by the Division is estimated at 32,000 square feet.

PROCEDURES

FILE CLASSIFICATION SYSTEM

6. The present file classification system was introduced in 1963. It has six major subject blocks:

Groups	1	-	19	Administration
"	20	-	34	Political and Defence
"	35	-	54	Economic and Social
"	55	-	64	Culture and Information
"	65	-	79	Science
"	80	-	89	Consular and Legal

7. Each subject block is divided into primary groups representing the principal facets of the main subject. Each primary group is divided into sub-groups representing more detailed aspects. Each group and hierarchical sub-group is given a title in the Records Classification Guide which becomes a file title. The Guide provides the parameters, and inclusions and exclusions where appropriate, for each suject group. It also indicates how individual files should be further sub-divided when needed. The file classification system provides for expansion of primary groups within the basic blocks and for additional subject blocks as necessary.

8. The Records Classification Guide is, as the name implies, a guide to assist in determining within what subject area a particular paper belongs. Having determined the primary and sub-gouups, a list of current files is available from which to select the specific file number appropriate to the subject matter of the paper to be filed. It is estimated that there are approxiamtely 20,000 individual file titles, many of which are further sub-divided by country or by name. During 1974 nearly 4,800 new file volumes were opened, involving about 2,000 new titles, the majority of which were name files rather than new subject titles.

CLASSIFICATION AND INDEXING

9. "Classification" is the selection of a particular file, from a master file list, on which an individual item is to be stored.

10. "Indexing" is the assignment of key words which identify sources, subjects, names of places, persons, organizations or events discussed in a document. These key words are intended to aid in the later retrieval of the document.

11. The classification and indexing of substantive material is carried out in the Analysis and Dissemination Section which has an establishment of eighteen analysts and a supervisor. There are four groups of analysts, one group serving geographic (or regional) divisions, one serving functional divisions, one serving the Economic Bureau and the fourth serving the public affairs and U.N. bureaux.

12. On receipt in the Section the material is sorted and passed to the analyst.

13. It is read, and a file number selected and marked on the original and the reduced copy. The action responsibility is also indicated when not specified by the originator.

14. Key words are underlined or hand written on the reduced copy. If the analyst considers that a particular paper does not deal with substantive information, it is not indexed. Conversely, papers which were not processed in the Mail Room as substantive may be so considered by the analyst and indexed.

15. ACR statistics for 1974 show that approximately 450,000 items were processed through ACRA but of these only 300,000 were placed on substantive files, the difference being accounted for by discovery of duplicate copies which were not filed.

16. During 1974, the indexing of material filed in substantive files resulted in 267,000 index cards. The discrepency between the number of papers filed and the index cards is due to many papers not being indexed. Outgoing telegrams and numbered letters, continuing correspondence on consular cases, papers associated with visit and conference arrangements, and some information copies, although placed in files in the substantive series, are not indexed.

...4

17. A sample of index cards selected at random indicates that the quality and depth of indexing falls far short of a satisfactory standard. Examples, among a great many, are:

- indexing of administrative material contrary to established procedure
- a letter from Nairobi discussing student dissatisfaction as an indication of political difficulty for the local regime indexed under "Nairobi - University".
- a telegram from Rome discussing the sale of destroyers to Yugoslavia indexed as "Rome, Destroyers".
- a paper discussing policy on water exports indexed as "Environment Canada".

18. Many communications received by the Department, such as requests for information and organized petition material are processed through the classification and indexing procedures. While the analyst need only scan and indicate a file number for each item, the total volume of work involved is considerable. If such material were identified immediately on receipt, it could by-pass the indexing operation and thereby reduce the workload of the analysts with consequential improvement in the quality of the indexing operation.

FILE SCHEDULING, STORAGE AND RETRIEVAL

19. The scheduling of a file is the assignment of the period of time that is to be held at at various levels of availability pending its ultimate disposal. Schedules for departmental files were developed in liaison with the users. These were submitted to and approved by the Dominion Archivist. In general, schedules involve two periods of time starting from the date the volume is closed: the first being the length of time the file will be held by the Department; the second being the length of time the file is to remain intact until its ultimate disposal, which may be complete destruction, or indefinate retention, as determined by the Dominion Archivist.

20. Records Management Division maintains substantive files in Randtrievers, in a Dormant Records area, and its administrative and consular files in a sub-registry.

The Randtriever holds:
17,000 active files (file titles)
6,800 closed volumes of active files and
1,000 dormant files (overflow from the Dormant Section).

New volumes are being opened at the rate of 400 each month.

21. The dormant files occupy an area of 1500 square feet on the ground floor of Tower "A". Approximately 12,000 file folders are held in the dormant file storage area. The Dormant Files Unit is also responsible for liaison with Public Archives Records Centre (PARC) at Tunney's Pasture and all requests for closed volumes, whether held by ACR or by PARC are serviced by the Dormant Files Unit. It is estimated that the number of requests each month averages 500 for files held locally and 500 for files held at Tunney's Pasture.

22. There are several aids to assist in identifying and locating information in active, closed, and dormant files:

- the file classification guide and file lists for the period 1963 to date.
- microfilm of index cards. Index cards have been made since at least 1927. The depth and quality of indexing, however, has varied from time to time.
- index cards covering material indexed in the current year.
- file lists which go back as far as 1909 for some papers.
- file lists for material held at the Public Archives show the file number, date range, subject, its PARC location and if it has been destroyed.
- KWOC index. A computer listing of 1940-63 series of files by subject title.

23. A survey over a period of three months revealed that 48 files a day were being charged out to the divisions. Of these, 23% were from the consular series which were subsequently moved from the Randtriever to the sub-registry near the Consular Bureau. 37% were from the 20-34 Policital and Defence Block: 16% were from the 35-54 Economic and Social Block: 22% were from the 55-79 Culture and Information Block and 2% were from group 81 - Legal Affairs.

The survey also showed that the distribution of charge-outs was as follows:

21%	to	CSP	6%	to	FCP
15%	to	FAP	5%	to	GAP
12%	to	ECP	5%	to	GWP
11%	to	FLP	4%	to	GEP
8%	to	PPR	4%	to	GPP

PROCEDURES

Incoming Telegrams (ACT)

24. Distribution of "Action" and "Information" copies is determined by the originator as indicated in the telegram. On receipt in the Comcentre they are reproduced and an "Action" copy, along with an "Advance" copy is delivered directly to the Action division. When requested by the originator "General" distribution of 130 copies may be made. This is infrequent.

25. In addition all telegrams which are considered by the Communications Centre to contain substantive information are given a wider distribuiton (forty-one copies) than indicated in the telegram.

26. On receipt of the "Advance" copy, the recipient division sends it to the Registry where it is retained for possible reference. When the action division has completed its action, the "Action" copy is also passed to Registry for further processing. Other divisions may send their "Information" copies to Registry if they wish them to be filed.

PROCEDURES

INCOMING MAIL (ACR)

27. The mail is sorted and material for other agencies, posts, and personal mail is removed and dispatched. The remaining mail is scanned and material for administrative and Consular Bureaux is removed and delivered to the sub-registry servicing them. Material such as organized petition mail, requests for information material, routine travel notifications from other departments and similar mail, is removed and passed directly to the action division without further processing at this time. The reamining material is then passed to the Documents Retrieval and Reference Centre.

Documents Retrieval and Reference Centre (ACRD)

28. Many items, particularly numbered letters, specify distribution of copies for information addressees. The number of copies needed for distribution, including an "Advance" copy to be passed directly to the action division is reproduced. In addition the first page is reproduced in a reduced format for indexing purposes. Advance and information copies are passed to the messenger service for delivery to the appropriate divisions. The original, accompanied by the reduced copy is passed to the Analysis and Dissemination Section (ACRA) where it is classified, indexed and returned to ACRD. The original is removed and forwarded through the messenger service to the action division. Key words on the reduced copy are identified and the number of copies required for filing reproduced. The index copies are cut to size 8" x 5" and stored alphabetically in Kard-veyers.

Material from Divisions

29. Procedures for processing material from the Divisions vary for the different types of material.

- Consular material is returned to the sub-registry (ACRP) where it is classified and indexed. It is then passed to the Documents Retrieval and Reference Centre (ACRD) where index copies are prepared in duplicate (one set for the reference centre and one for the sub-registry). The original and one set of index cards are returned to the sub-registry.

- Incoming Telegrams, copies of internal memoranda and outgoing correspondence and other material which has not been classified and indexed is passed to the Analysis and Dissemination Section (ACRA) where it is classified and indexed. It is then passed on to ACRD. Index copies are made up and filed in the master index (KARD-VEYER). The original is placed on its file and stored in the Randtriever.

- Incoming numbered letters which were classified and indexed on receipt are placed directly on file.

TELEGRAM SURVEY

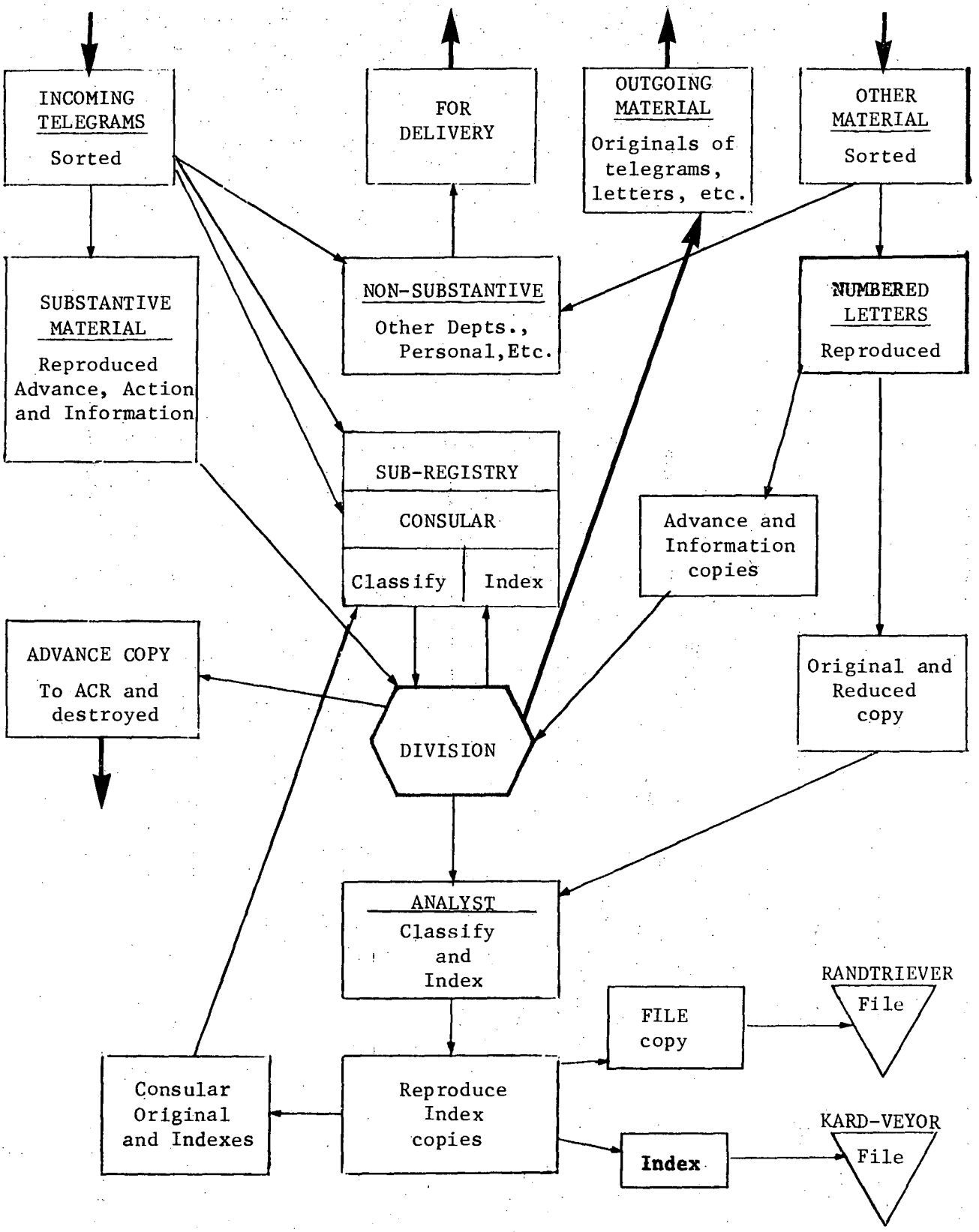
30. Since telegrams play such an important part in the flow of information in the Department, a survey was made of the telegrams received during the months of September and October, 1974. A sampling procedure was followed in order to portray useful information on the 18,000 telegrams carried in the system in the two-month period, as shown in the following table. The data from the sample showed a very close correlation with that obtained from a complete traffic analysis made during a one-week period in May, 1974.

Table 1 - Summary of Incoming Telegrams

Survey period - September and October, 1974

Total volume - 18,000 Telegrams - 9,000/month

	Calculated Volume		Pages per Telegram		Average No. of Lines per Telegram
	Monthly	% of Total	Average	% of Total	
C.I.D.A.	447	4.97	1.4	4.3	20.0
Other departments	394	4.38	1.6	4.3	21.0
Other posts	184	2.05	1.6	2.0	20.0
Passport Office	184	2.05	1.1	1.4	8.9
12 Admin. Divisions in ACP, AFP, APP	2,289	25.44	1.06	16.8	8.5
Consular Bureau	815	9.06	1.2	6.5	13.6
Security & Intell. Liaison Bureau	157	1.75	1.0	1.1	22.0
Public Aff. Bureau	553	6.14	1.3	4.9	30.0
Coordination Bureau	157	1.75	1.3	1.4	14.3
Legal Aff. Bureau	263	2.92	2.0	3.6	30.1
U.N. Bureau	237	2.63	4.3	7.0	87.1
Def. and Arms Control Bureau	710	7.89	2.6	12.5	39.5
Econ. and Scientific Aff. Bureau	1,263	14.03	1.9	16.2	30.3
African and Middle East Aff. Bureau	316	3.51	2.2	4.7	42.1
Asian and Pacific Aff. Bureau	289	3.21	1.4	2.9	21.5
European Aff. Bureau	421	4.68	2.4	6.8	40.0
West. Hem. Aff. Bur.	210	2.34	1.9	2.7	27.5
Protocol	105	1.17	1.8	1.3	14.2
TOTAL	8,994				



RECORDS PROCEDURES

External Affairs Canada / Affaires extérieures Canada

ORGANIZATION CHART – ORGANIGRAMME

Reports To-No/*Relevé de n°*: ACP

Title/*Titre*: Bureau of Communications and General Services

Effective Date/*Date d'entrée en vigueur*:

Branch/*Direction* – Post/*Mission*: Records Management

Chart Title/*Titre de l'organigramme*:

Page: of/*de*: Pages

Approved By/*Approuvé par*:

- Director ACR
  - Deputy Director Systems Development
    - Records Improvement Officer
    - Post Liaison Officer
    - Training Officer
  - Deputy Director Records Services
    - Analysis and Dissemination Unit ACRA
    - Admin. and Consular Records Unit ACRP
    - Documents Retrieval and Reference Centre ACRD
  - Records Scheduling and File Depository Supervisor ACRR
    - Scheduling Unit
    - Dormant Records
    - Special Records Clerk
    - File Depository Supervisor
    - File Control
  - Messenger and Vehicle Manager ACRK
    - Despatcher
    - Conveyor Station Messengers Supervisor
    - Financial and Administrative Officer
    - Divisional Secretary
  - Mail Manager ACRM
    - Incoming Mail
    - Outgoing Mail
    - Personal Mail

ANNEX III

TECHNICAL ASPECTS RELATED TO FUNCTIONS

1. It would be a major undertaking to discuss the numerous technical aspects which could possibly be involved in an information storage and retrieval system for External Affairs. A more manageable discussion of the technical aspects would stem from a knowledge of the functions which must be put in place in order to provide the envisaged system, and so this approach has been chosen.

2. The features which will be discussed in this Annex are based on the determined needs of an External Affairs information system and an examination of the very few working systems similar in purpose to that required for External Affairs. These are as follows:

- Unique number assignment to each item entering the system.
- Controlled entry of documents into the system.
- Retention of the present subject files approach to information-handling.
- Availability of full text for all items within the system.
- The need for a separate group of qualified personnel to perform indexing and retrieval of information.

3. It will be noted that the list of features is not exhaustive but comprises only those which, at this point in time, have been considered as probable components of the eventual system.

Unique Number Assignment

4. Assigning a unique number to each document is necessary for the purpose of retrieval and adequate control over information entering the system.

5. This assignment can be handled in a number of ways. For example, where a unique number is already being assigned, such as for telegrams, this existing procedure could be absorbed into the system. This might result in a series of numbers, not necessarily unique. To avoid duplication between series, a prefix would need to be attached to uniquely identify that series.

6. The problem with such an approach is that of control, since assignment of numbers for different categories of material would probably be carried out by different groups, each with its own specific needs to be met. Furthermore, not all communications assigned numbers in this manner would reach the system. For example, ITC messages to ITC HQ passing through the External Affairs Comcentre, or non-substantive material of an administrative nature would receive numbers but would not enter the system. Excluding such items would leave gaps in the numbering system, further deteriorating control.

...2

7. One solution is to ignore pre-assigned numbers and to assign a unique information system number to documents destined for storage within the system. The assignment of these numbers could be done just prior to entering the system, requiring controlled entry. Three system entry points are envisioned; the Mail Room, the Comcentre and the Bureaux. An initial screening in each of these centres will be required to determine which items will enter the system and to then assign the relevant numbers.

8. In order to best control the assignment of numbers, all material to be numbered could be passed through a central location. This would probably not be the BICO since it might result in documents being misplaced between the point of entry and the ultimate designation or multiple assignments of numbers to duplicate items. In addition, a delay is introduced into the system. A better systems solution is to delegate the task to each entry point.

9. Minimal delay and immediate numbering will result. All telegraphic communications could be numbered by the Comcentre, all incoming mail would be numbered by the Mail Room and internally-generated material would be numbered by the originating Bureaux.

10. The problem of assigning unique numbers now reduces to providing these areas with numbers from a central control point. The simplest and least expensive way is to allocate blocks of numbers to the various areas as needed, possibly on a daily basis in amounts equivalent to an estimated day's requirements. Carryover or number shortages might, however, present a problem.

11. A more sophisticated way is to provide each area with automatic numbering devices which are centrally integrated and controlled. On demand the next number in an overall sequence is provided. Such a device could just as easily be polled by a computer as an individual. In fact, the central control device might even be a computer. As a precautionary measure, the block allocation principle could be reverted to in case of equipment breakdown.

Controlled Entry

12. A requirement for controlled entry into the system is obvious from the previous section. Since each item is immediately subjected to numbering, the existence of an item is known. This is insufficient control, however, as loss of an item leaves behind only the fact of its loss. It would be necessary to capture a few basic identification facts about the item to enable a request for a replacement to be made.

13. This can be accomplished by holding the original at the entry point and forwarding a copy only, or by manually recording some facts on a form for batch entry into the system. More sophisticated means, such as direct entry into a computer-controlled inventory, are, of course, the most desirable as they would provide immediate and more secure entry and would completely integrate with the proposed system.

Subject Files

14. A basic premise of the proposed system is that subject filing is useful and should be retained.

15. Building subject files of complex material is a difficult task to carry out well. Rules for this operation are usually difficult to describe and thus the task is not easily automated.

16. If the essence of a text could be concentrated in one paragraph in the item, such as is done by abstracts, subject selection would be eased since the entire item would not need to be read with as much care. This would require a more disciplined approach to communications generation and could only be achieved for material originating in the Department. Communications entering from outside would not be expected to comply with such rules. Automatic selection of keywords by computer could obviate the need for subject files since the computer could make the necessary selections, but this approach is still providing unpredictable results and is still the subject of research. It is likely to be a number of years before this approach could be confidently adopted.

Full Text Storage

17. Full text storage of documents and communications is necessary to provide the complete item on demand. A minimal storage system for full text would consist of originals and paper copies stored either centrally or at various locations. Problems associated with this approach are volume and massive paper-handling, especially in large growing systems such as in this department.

18. A number of alternative means of capturing and storing full textual information other than the original source documents are available. The main considerations in selecting the most appropriate are the volume to be retained, amount of new input, the volatility of individual items in the collection, time considerations and the need for accessibility to the information.

19. In the case of External Affairs the volume to be retained is quite large and is constantly growing. Once received, the individual items are very stable, there being seldom any need to update the information as would be the case for an inventory control system.

20. Since time is a crucial factor in the information field, it is imperative that new material be immediately made available to appropriate personnel as fast as possible, while retrieval of information, for the most part, requires rapid response, a characteristic achievable using full text storage and CRT retrieval.

21. It is against these External Affairs requirements that any full textual storage system will need to be examined.

22. Full text systems which use electronic representation of the text fall into two categories; machine-readable, where each character of information is electronically coded, and video, where an electronic image of the entire document is captured.

23. Video systems allow rapid information capture and provide a means of attaching some identification information to each image to assist in retrieval. The images are stored sequentially on magnetic tape and provide quick update capability, multiple user-access to the same information and reasonable storage costs. The two main suppliers of video systems of this sort

are AMPEX and TRANS-A-FILE. The main disadvantages are few suppliers, limited choice of hardware, and high capital expense. A basic system with four terminals, two tape drives, random access cross-referencing, one video input and associated equipment would cost in the neighbourhood of $750,000.

24. Machine-readable systems provide more flexibility from the point of accessibility of information, storage of the information and dissemination. Typical hardware costs would be in the order of $1,500,000. However, a major problem exsits in the capture of the information itself.

25. One way of capturing all information in the required form is to retype onto computer-readable medium. This would require a vast typing or keypunching operation and result in an excessive annual operating expenditure.

26. Optical character recognition described in Annex 7 is another possible way of capturing information in computer-readable form. The state of the art requires very strict quality control and extremely expensive equipment.

27. A more realistic approach is to capture documents in machine-readable form at source, either through the use of automatic typewriters, or directly into computer storage if possible. This is presently limited to telegraphic communications, although with appropriate introduction of word processing equipment, it could be extended to all internally-generated material. Externally generated material would continue to be a problem. At the moment electronic capture by retyping all such material would be the only alternative.

28. The limitations in the state of the art, and high cost of capturing all relevant material in machine-readable form negates the possibility of electronic access from a central point for all material.

29. A non-electronic form of providing full textual material is microform. An analysis of available microform indicates that for the type of system required in External Affairs, microfiche and roll film cartridges would be most appropriate. Without additional support, use of these forms will not satisfy departmental requirements. A means of access to the information must be provided and the time delays introduced through the filming process must be overcome.

30. The use of microfilm instead of fiche is not as attractive, since once the fiche is made, its handling, equipment for viewing and copying are much cheaper than for microfilm. Information is also more easily parcelled on a fiche than an a roll film cartridge.

31. The capture of any information already in machine-readable form is compatible with microform through the use of COM (Computer Output Microform). One example of such an application would be telegraphic communications which could be sorted electronically and captured on microfiche via COM for cheaper and less bulky dissemination.

32. Accessibility to this non-centralized paper and microfilm mixture can best be achieved by maintaining computer references, accessible throughout the Department via remote terminals.

33. The latter approach of using a paper/film/computer mix enables optimal use of each form to its utmost state of the art, each reinforcing the other's limitations and providing what will probably prove to be the most economic system.

Indexing, Retrieval and Information Specialists

34. No matter which method of full text capture is employed the information put into the full text system must be described and represented for retrieval purposes. The description process consists of identifying each item entering the system as to origin, authorship, content and other bibliographic information. After the item of information entering the system has been accurately and completely described, the item can be located by means such as subject or keyword selection.

35. The most important element in an information storage and retrieval system is the index. Creating an index involves making decisions as to the depth of indexing, the degree of open-endedness and the level of expertise required to classify the material. Index strategies may be hierarchical or they may use keywords without hierarchical significance. Often combinations of these two approaches are used. Hierarchical systems have the advantage of providing a structure for information, but suffer from difficulties in making modifications as new categories arise. The use of hierarchical classification for storage purposes (based on primary characteristics), coupled with keyword cross-references to permit greater flexibility in retrieval (based on secondary characteristics), is fairly common in the information field. Indexing strategies should be as open-ended as possible, in view of the gradual shift of interests that occur.

36. The main purpose behind indexing is to provide better retrieval capability. There are three basic methods by which retrieval may be performed:

- Whole text scanning. This primary method requires no indexing, only access to complete texts. A query is formulated and documents are manually scanned from end to end. Only one person need be involved and thus no translation problem is present. This would require an intelligent searcher in order to be able to interpret what the document says in terms of his query. A variation of this would be to pass on the query to an information specialist who then becomes the searcher, thus reducing the amount of time spent by the ultimate users in hunting for information. In order to provide adequate service, however, it is imperative that such information specialists be intelligent and knowledgeable in the subject matter.

- Keyword File Scanning. Because human scanning is limited in speed, a secondary method of retrieval is usually adopted. Each document before being stored is given a preliminary scanning by an indexer who selects words from the text that are to represent the content. These keywords are placed in a file together with the document address in the store. A query is again formulated, then a keyword file is scanned. Documents which appear to match are then selected and only those need to be scanned in detail. To search the file, the searcher must match the file keywords with search words he has formulated. But because of the richness of language, there is no certainty that the words the selector chooses will be the same as the words selected by the indexer. There will be a range of related words that may all represent the same or closely similar topics.

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Here two intelligent people are involved; an indexer interpreting the document and a searcher interpreting his query. A match is then made in the interpretations. Even if a text were to exactly satisfy a query, the imperfect representation of a text by the indexer, and imperfect selection of keywords for matching might result in a failure to retrieve relevant material.

One way of reducing mismatching is to combine the searcher and the indexer. In such a system, the end users of information would convey their queries to an information specialist who would then do the searching. The search would be more effective, since the specialist would have been involved in the original indexing procedure itself. Intelligence and subject-matter knowledge on the part of this specialist is now a must. His indexer role will, however, provide him with increased subject-matter knowledge.

There is, of course, a problem area which is intensified when very large volumes of information are being handled. This is due partly to numerous information specialists who handle information in their specialty, but who, when searching, must access information entered by specialists in other subject areas. In addition, new specialists taken on strength inherit information processed by their predecessors. All this results in increasing mismatching of query and information.

- Descriptor File Scanning. In attempting to overcome the problems of interpretation a third method of retrieval may be adopted. Instead of using keywords individually generated by the indexer and the searcher standard descriptive terms drawn from a controlled and structured library of terms are utilized.

  By having both the indexer and searcher use the same vocabulary the possiblity of choosing the same words to represent the same topic is increased. Furthermore, by building a structure into the vocabulary that links up related descriptors, a likelihood is introduced that even if the indexing words are not the same as those used in searching, the words are related and linked in the vocabulary.

37. One can conclude, therefore, that of the three retrieval methods presented the "descriptor file" or rather the "controlled vocabulary" approach is most desirable, coupled with a group of information specialists knowledgeable in the subject matter who perform both indexing and retrieval. It is, however, important to provide additional aids for retrieval purposes to maximise the number of ways of selecting an item, and at the same time to minimise the possibility of never retrieving a relevant item. Two such aids are described below:

- Basic information such as author, title, source, abstract, etc. should be entered into the system either clerically at points of entry or better still automatically. This would free the specialist's time for his more important function of indexing the text.

- Utilizing a structured vocabulary between text and indexing, as well as between query and retrieving. This will inevitably result in reduced work throughput during the initial months since the need to consult the vocabulary at each step is time-consuming. However, the stated relationship between words will provide a checklist to enable the retriever to more intelligently and comprehensively respond in searches.

38. It is highly impractical to require continual vocabulary checking, or to involve each specialist in maintaining the vocabulary. The solution has two components, the first being to make vocabulary access invisible to the specialists by automation. In this way any words chosen by the specialists would be converted to a standard descriptor complete with linkages. Ambiguous words could be indicated to the specialist who would clarify his requirements by displaying the various associated standard descriptors. Any previously unencountered words would be added to the vocabulary and flagged for futher action. Here the second component comes into play. Vocabulary maintenance would be performed by a vocabulary control group whose main role would be to continuously monitor the vocabulary to provide:

i) new words (flagged automatically) with appropriate linkages;

ii) to continually update old linkages as new usages become apparent; and

iii) to assist in searching when normal access to the information banks has proven pointless.

39. It is imporant to allow automatic build-up of the vocabulary and to actually provide for continual growth and change. Numerous information systems have floundered because they have lacked such features and therefore fell into disuse when they were no longer able to cater to current word usage. The effort required in developing a comprehensive, all encompassing vocabulary at the outset resulted either in excessive development costs and time delays or too cumbersome a vocabulary for efficient use and maintenance.

40. Setting aside the problem of how best to enforce vocabulary control, one is left with the problems of input, storage and retrieval of the descriptive information and associated pointers to full textual material.

Input

41. The simplest form of input would be to have indexers fill in standard forms and forward these to a central location for subsequent processing. Assuming a large volume of information is involved, such processing will consist of converting the form into computer-readable input and having appropriate computer programmes check and produce the required cross-references, bibliographic files, etc. Such an approach introduces time delays into information availability and requires a fairly high operating cost in the form of a keypunch pool.

42. A better approach would be to provide direct input from the indexers into the computer. This might be carried out either by providing interactive entry to allow immediate error corrections under the main computer's control or provide the indexer with "intelligent terminals" which would provide some immediate correcting capability and then convey the information to the main computer. The latter is most attractive as it would alleviate the load on the main system and should the main system fail indexers would still perform a major portion of their work until the main system is back in action.

43. An even more sophisticated approach would be to have full text input into the main computer and indexers would then only scan and select appropriate descriptive information. This, however, suffers from a high initial and ongoing operating expenditure, as well as complete system shut-down if the main computer fails. The latter could, to some extent, be circumvented with innovative use of intelligent terminals.

Storage

44. The exact method of storing descriptive information is highly dependent on the volume of information being retained, the size of description to be retained, the depth of indexing, the speed of retrieval required, the type of equipment selected, and the budgetary resources available.

45. As this is a highly technical area, it suffices to say that once a more definitive picture of needs is developed, appropriate storage configurations can be selected for the information itself as well as the descriptors.

Retrieval

46. The method of retrieval is very closely related to the storage configurations put in place. It is most probable that searching for information based on the descriptors will be carried out by means of a terminal connected to a central computer. Once a list of relevant document numbers is obtained the documents themselves could be retrieved in a different manner, depending on the full text storage technique employed.

47. Descriptor queries can be carried out virtually instantaneously by direct searcher-computer interaction, or a batch approach could be used whereby a query is posed via a terminal but is then placed in a queue on the computer. The speed of response would depend on the priority, assigned by the searcher. It is quite conceivable that both techniques would be available to be utilized as the situation requires.

48. The key feature to **consider** in a retrieval system is not the hardware aspects of the storage techniques but the selection criteria. There are basically two selection techniques in common use:

i) The exact match-approach allows the query to be posed as a logical Boolean expression and selects from the data base only those documents which exactly satisfy the expression.

ii) The occurrence approach develops a matrix with query keywords along one axis and document references containing any of these keywords along the top. The searcher then chooses the most pertinent references. One major advantage of this approach is that not all query terms need appear in a particular document in order for it to be cited. It is left up to the searcher to decide whether or not to look up the full text.

49. Modifications to both systems such as assigning weighting factors to keywords representing a document or providing the capability to indicate word pair relationships are used to provide some means of measuring the relevancy of the document to the terms selected . In some full-text systems, such

modifications are done automatically and weighting factors are usually based on frequency of occurrence of words in a document or a statistical weighting relative to the rest of the data above.

Conclusion

50. It is obvious that a vast spectrum of possibilities exist as to how each of the features mentioned above can be implemented. In fact, a great deal of interrelationship exists between features. A decision taken on one feature can greatly influence the possibilities available for any other feature being considered. No clear-cut decisions can be made until information system parameters such as volume, speed of access, entry points, flow and location of the information have been determined. A number of alternatives would then be prepared and selection based on a cost/benefit study would then be possible.

THE USE OF OPTICAL FIBRES IN COMPUTER COMMUNICATION

1. The main attraction in using optical fibres for communications is the ability of light waves to carry a vast amount of information as compared to ordinary twisted wire pairs. As an example, two strands of optical glass fibre, approximately one hundred microns each in diameter, can carry conservatively twenty-five megahertz of bandwidth in each direction. This is equivalent to approximately five video channels or 10,000 voice channels.

2. Coherent transmission of images requiring no conversion at the reception end is still only at the research level. Coded video or voice transmission either analog or digital has a fairly well-developed technology.

3. Northern Electric is presently investigating the market potential of optical fibre transmission, putting them in the forefront of the industry. A conversation with Mr. Bob Oakley of Northern Electric has yielded these facts:

- The fibre they are manufacturing is a single glass fibre externally coated with a plastic film. This is a different approach from other fibre manufacturers, such as Corning, who use glass fibre bundles, and Dupont who uses plastic fibre bundles.

- No radiation is generated when transmitting through optical fibres, unlike wire. This means no shielding is necessary. The security factor of the Northern Electric produce is much higher than other manufacturers because of their single strand approach. A bundle of fibres could be tapped by just a few strands being diverted. A single fibre is not easily tapped since the only method is to cut the fibre and insert a 'splitter'; a very delicate, highly-sophisticated operation. Much to Northern's chagrin, they have not as yet found a practical way of tapping into their single fibre strands without destroying the fibre itself. The reason for trying is quite obvious. If 10,000 voice signals can be transmitted, a single strand tapped at appropriate points would be a very cheap means of wiring.

- Fibre strength is quite extraordinary. Its tensile strength is equivalent to 22 gauge copper wire. However, as it is much thinner, coatings and bundling into cables are required to allow installation in existing conduits without damage.

  Flexibility is also quite high. Although it is extremely thin, its use in any length allows 180 degree bending without any problems.

  Contrary to some belief, optical fibres are not hollow. They act, however, like waveguides because of their transparency and surface coating.

- The transmission of information along optical fibres does not require appreciable energy consumption, nor are amplifiers needed every few feet, since optical fibres pose very little resistance. The main loss in signal strength is due to light energy absorption by the fibre material itself causing it to heat up slightly. The applied coating dissallows loss from the outside surface. Another source of loss is due to backward reflection when bends are encountered. All this still causes very little loss for most applications. In fact, a 2,000 foot stretch of fibre could easily be used without an appreciable loss of strength of signal.

- Any installation which could be negotiated with Northern at this time would not be off the shelf since commercial availability is not yet a reality. However, Northern is looking for projects which would in a sense be research and development oriented from their point of view. Necessary interface equipment has already been developed by Northern but again are not yet standard off-the-shelf items.

- The cost of using fibres should, when commercially available, be equivalent to using coaxial cable. This is about thirty-five cents per foot. The present research and development manufacturing cost to Northern is $150 per foot.

  Peripheral connectors could cost anywhere from fifty cents to $50 each.

  The main saving of optical fibres is, of course, the fantastically high volume which can be carried for an eventual equivalent cost to coaxial cable. When high security requirements exist, savings increase substantially as no secure conduit is necessary. The installation of such conduit is expensive, particularly in an existing building.

4. Northern Electric would be more than happy to discuss this matter further when details such as the type, number and location of terminals and volume and speed of transmission have been ironed out.

MICROFORM

1. Microforms are a natural solution for the growing paper storage problem that exists in just about every organization. The storage problem should, however, be viewed from an overall systems viewpoint. All to often filming and storage are accomplished without much thought given to eventual retrieval needs.

Microform Type

2. The standard type of microform is roll film, 16 mm being used for letter and legal-sized pages, while drawings, maps, newspapers, etc. are on 35 mm. It is the cheapest and fastest method of micro-recording in terms of recording and processing hardware. The use of cartridges has added slightly to the price of processing but has greatly increased ease of handling and film protection. The main problems with roll microfilm are locating the particular frame of information required, the cost of viewers, reproduction and the large volume of information contained on one cartridge. The latter disallowing cheap and widespread distribution. This is a poor choice for high-volume retrieval.

3. Automatic searching of cartridges has been made possible by the addition of coded patterns onto the film. A logical question can then be posed, the appropriate cartridge mounted and the system will automatically scan the entire microfilm for the desired combination of retrieval terms. For large volume collections, this becomes very burdensome since many cartridges may have to be mounted and dismounted. A further limitation is the amount of code which can be applied to any specific image. Furthermore, automatic equipment of this nature is fairly expensive and cannot be made readily available throughout an organization.

4. The other microform consists of individual 'cards' of microfilm, called microfiche, which contain substantial amounts of generally related data. Magnification of 24 times and 48 times are being adopted as international standards, the latter accommodating approximately 200 images per four-by-six inch fiche. Production of the original fiche requires more sophisticated and expensive equipment than for roll film. Subsequent cheaper duplication, the greater ease of microfilmed information dissemination and the availability of inexpensive viewers make up the added initial expense. One of the objections to microfiche seems to be the ease of loss. Fiche jacket cartridges have been introduced to reduce this risk. The needs for these are many and are necessary for the storage of fiche masters.

5. Another form of unitized microfilm is the single frame jacket. This looks similar to the fiche but each element is separately held in a jacket for easy replacement. The original development of jacket fiche was to provide a cheaper way of fiche production. Roll film equipment is normally used for the filming. Such an approach is useful where frequent individual frame changes are required, such as catalogue updates. The major drawback is that jacket fiche do not conform to general microfiche standards.

6. A new type of fiche termed ultra-fiche has recently been introduced. An ultra-fiche can put 3200 pages on a four-by-six inch sheet of film. The disadvantage being the relatively high cost of master preparation ($500 per ultra-fiche, as compared to $5 per microfiche), limited viewer availability and to some extent too much material on a single fiche.

7. Aperture cards, another microform, are in fact the only truly unitized microform. Individual or groups of frames are mounted in a punched card. Code numbers punched in the card allow rapid retrieval by means of unit record equipment. This approach is widely used for large images such as engineering drawings but has found some application in areas such as the U.S. Patent Office. Both applications have low distribution requirements and relatively little demand for access. Aperture cards are basically limited by their production and maintenance cost. At present they are the most expensive form of microform.

Microfilm Type

8. Three types of film material are in common usage:

- Silver halide film, available in reversal or in direct copying type, is exposed by white light and chemically developed; basically used for original master copies and where archival requirements must be met.

- Diazo film, exposed by ultra-violet light and fixed by ammonia, only allows direct copying; used mostly for high-quality duplicates but use for masters and archival storage requirements might be possible, depending on the application.

- Vesicular or thermal film, a reversal film only, is also exposed by ultra-violet light but fixed by heat; fairly short-lived compared to the other two and is widely used for inexpensive duplicates.

The type of film or film mix used will depend on the specific application in mind.

Conclusion

9. For high-volume retrieval information, it seems that microfiche with automated separate indexing is most desirable while cartridge roll film is more applicable for low-volume retrieval such as archival storage. A large volume variety of equipment is available to suit almost any application. An attempt to convey typical costs is not realistic without considering system requirements. Some idea of equipment costs are presented below for comparison sake only:

	Cartridge	Fiche
Viewers	$ 1,500	$ 300
Viewer/Printer	5,000	2,000
Duplicator/Developer	15,000	3,000
Camera	4,000	15,000

10. The above figures represent comparable features whenever possible.

OPTICAL CHARACTER RECOGNITION

1. Optical character recognition machines convert printed information into computer-readable codes. The two most common forms of character recognition scanners are photocell arrays and flying spots. Standard OCR fonts are OCR-A developed by National Standards Institute with emphasis on machine reading performance and OCR-B developed by European Computer Manufacturers Association with emphasis on conventional appearance. However, the advance of machines which can not only read a variety of common machine fonts but also handprinted numerals and some special symbols are responsible for the rapid expansion of OCR.

2. The scope of applicability for OCR is currently limited to a particular variety of fonts, to fixed document formats. Poor performance on handwritten documents, the lack of standardization within the industry, problems with recognizing noisy and degraded characters and the limitation imposed on their speed (as well as increased cost) by associated paper-handling devices are problems which are currently being researched by the industry.

3. Presently available equipment ranges in cost from $11,000 purchase for a bare, hand-fed page reader to $15,000 monthly rental for more sophisticated readers and associated equipment.

4. The speed of reading is presently as high as 2,000 characters per second or approximately 1 page per second, limited by the speed of page-feeding. Error rates vary from 1 to 10%, depending on source document control.

5. An initial attempt to solve the problem of noisy, degraded and otherwise poorly readable characters has been to introduce mixed systems. This means, for example, an integration of OCR and key-to-disks where an operator, sitting at a console, can immediately verify unreadable letters or numbers if the OCR device detects them.

6. MOCR, Microfilm Optical Character Recognition, is a new technique designed, in part, to get around the paper-handling problem. It also claims to be able to deal with an unlimited number of character fonts. It uses a flying spot scanner together with a microfilm transport unit. The disadvantage is its cost, approximately $1 million.

7. The current state of the art in OCR still leaves much to be desired other than for routine, massive operations involving large volumes of simple, format-controlled information which typically utilize special purpose, standardized fonts and character sets. All successful operations to date exercise strict control over the preparation of documents to be scanned. Well structured departmental material such as memoranda to the Minister and Cabinet submissions would be of sufficiently standard format as to be amenable to OCR. Much greater formatting discipline would be nesessary before other departmental material would be suitable.

8. Within the next ten to fifteen years it is quite certain that OCR will compete with data encoding as the primary method of converting material to machine-readable form.

"B" Budget Forecast FY 1976/77

ACP - Bureau Priority No. I

Information Systems Development

An in-depth study has just been completed regarding the development of a Department-wide information storage and retrieval system. The general conclusions are that the records management and related services of the Department as at present constituted are incapable of coping with the increasing flow of complex material essential to the efficient conduct of Canada's external relations, and that a coherent overall improvement programme must be instituted to deal with this deteriorating situation. More specifically, it is recommended that there should be some decentralization of functions from the Central Registry to "user" bureaux and that the system should be supported by a fairly extensive application of automation equipment and related micrographic techniques. This new system would also be employed for certain functions, now only inadequately performed by traditional means, to support senior management in the correlation and formulation of foreign policy. Currently more detailed specifications and an implementation plan are being drawn up with a view to submission to Treasury Board for the necessary approval in principle for the initiation of an electronic data processing programme.

It is envisaged that the system will become fully operative in FY 1977/78, during which year the computer would be installed. Some initial expenditures will be incurred in the current fiscal year and the essential major preparatory steps will have to be taken in FY 1976/77 involving personnel, operating and capital costs as follows:

Personnel	
22 reclassifications of existing positions	- $176,000
and 11 additional man-years	- 187,000
to provide for reorganization, supervision, computer operations and Bureau Information Control Officers.	
Operating Costs	
6 months' rental of "mini" computer to develop system procedures, to train personnel and to establish certain computer files	- 60,000
Capital Costs	
Shielding of computer room and secure links to CRT's for TEMPEST suppression	- 150,000
10 microfiche viewers and 4 reader/printers	- 22,000
	$595,000

BUREAU OF MANAGEMENT CONSULTING
BUREAU DES CONSEILLERS EN GESTION

Project No. 1-1064

April 10, 1975

PROJECT AGREEMENT BETWEEN
THE
DEPARTMENT OF EXTERNAL AFFAIRS
AND THE
BUREAU OF MANAGEMENT CONSULTING

CLIENT: Mr. L.J. O'Toole, Assistant Under Secretary

PROJECT: The Development of a Substantive Information System, Phase II.

Phase II of this project will continue work begun in Phase I by providing more detailed specifications of the approved system, including performance characteristics and staffing requirements, and a detailed implementation plan.

These specifications are the necessary basis for both TBS approvals and the preliminary steps towards implementation.

BACKGROUND:

The Phase I report described in detail the basic problems confronting the Department in the area of information storage and retrieval and the variety of possible approaches, together with a "Preferred System" to deal effectively with these particular circumstances. In addition a tentative implementation plan was presented to indicate the general time frames in which system development could take place. Departmental approvals for the concept and general outline of this system were obtained, and 'B' Budget submissions for resources were put forward to Treasury Board.

PROPOSED WORK PLAN FOR PHASE II:

Activities in this Phase are designed to define more clearly the substantive information system presented in Phase I. Following the work carried out in Phase II the initial steps towards implementation will be possible, in which both departmental procedures and resource utilizations would be affected.

The large number of activities involved have been grouped into broad categories for descriptive purposes:-

System Characteristics: Principal tasks here will be determination

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of the indexing procedures and identification of the impacts which catering to Levels III and IV activities will make upon system capabilities and capacities.

Following definition of the system flow and procedures and capabilities required, the performance characteristics of the system will be documented. This will form the basis of the system description necessary in the invitation to tender, which is expected to follow this Phase.

Hardware and Software Characteristics: Various combinations of hardware and software could satisfy the system requirements. These various combinations would involve the Department in different levels of development work, and some might have undesirable organizational impacts. The examination of available alternatives is therefore an important activity, and is one which could screen out some configurations prior to public tender, or is one which could reveal a software package well suited to use in the Department, with minimal changes.

Structure and Responsibilities of the Organization: The necessary major automation innovations already identified are to be matched by changes in organization. New and revised functions will require the re-definition of some seventy positions, along with introduction of an organizational structure which will assist effective management and provide career paths for all incumbents. A large part of this activity will be to describe each job (or group of jobs) for classification purposes.

Physical Security: An important aspect of the system is that of physical security. Methods are required to prevent remote electronic eavesdropping of operations involving classified material. A complication is the dispersal of terminal access points throughout the building.

Definition of both the means of protection and the timing of installation are critical to the implementation plan since no equipment delivery could take place until this task is completed.

New and Transitional Procedures: Many of the existing procedures will disappear in transition to the new system. It will be necessary, therefore, to define procedures to support new operations. Such definition will encompass the movement of material through the system, Bureau Information Control office procedures, Central Information Control office procedures, Computer Operation procedures, Micro Operations procedures and revisions to the residue of traditional Registry procedures.

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At the same time transitional procedures will be defined to ensure an orderly transition from the existing to the new system.

RESOURCES:

It is understood that in the interest of continuity the original team will continue to operate in Phase II. However, the team will be augmented by specialist resources from the Department as required. For example, Mr. McNeilly of the Management Services Division will be attached to the project in this early stage of development, in order that his special competence in technical aspects of the system will be brought to bear. In addition, the services of a Classification Officer from the Personnel Planning and Development Division will be provided to assist with organizational aspects of the system. It is further understood that plans call for a Director of Information Systems to be appointed before the end of Phase II.

With these facts in mind we propose as before to assign to Phase II Harry Monaghan and Sam Niedzviecki.

SCHEDULE:

Phase II will have a duration of approximately three and one-half months and will commence , 1975.

Work carried out on the project in Phase I and to date has progressed further than was originally anticipated, and has overlapped with activities identified as Phase II activities in the first agreement between EA. and BMC. The workplan identified for Phase II will result in most of the work originally conceived as Phase III being completed. Thus the phasing of the overall project is being telescoped into fewer phases.

COST:

Cost for Phase II not to exceed $27,000. Fees will be charged at a per diem rate of $225.00 for Harry Monaghan and $200.00 for Sam Niedzviecki.

Any necessary travel costs and away from home expenses will be in addition to the per diem rate.

Billing is by journal voucher at month-end for costs incurred.

If these arrangements are satisfactory, please sign and return the duplicate of this agreement.

Dept. of External Affairs

A.B. Howell,
Director,
Bureau of Management Consulting.