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GOVERNMENT INTEGRATED
OFFICE COMMUNICATION (TRIAL) SERVICES

PROJECT AND BUDGETARY PRICE PROPOSAL
TO
TRANSPORT CANADA

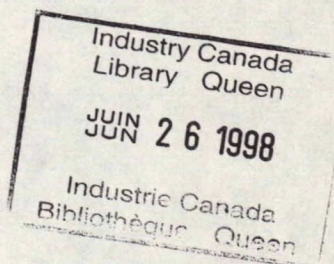
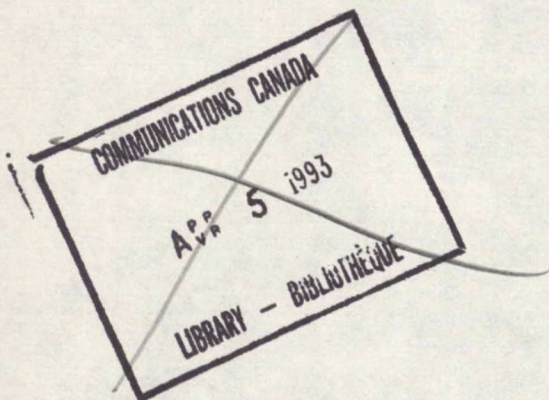
GOVERNMENT TELECOMMUNICATIONS AGENCY

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DIVISION OF DEVELOPMENT & ENGINEERING
GOVERNMENT TELECOMMUNICATIONS AGENCY

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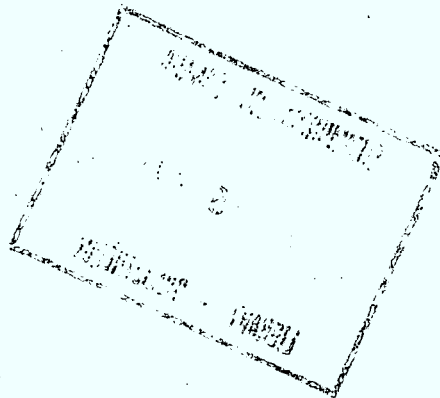


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1.0 INTRODUCTION

1.1 Background

The Government Telecommunications Agency (GTA) of the Department of Communications (DOC) has identified the need for electronic office communication services throughout the government and is consequently planning an operational service trial based on standardized telecommunications equipment and systems.

The planned integrated office communications trial service involving Northern Telecom (NT) supplied equipment is aimed at establishing the viability and cost effectiveness of electronic office communication capabilities such as those provided by the NT Meridian SL-Integrated Service Network (ISN) to support program and public administration functions of the government.

This proposal is a response to the request of Transport Canada to include Transport Canada in the planning of the Government trial service and to provide a budgetary price estimate for their participation in the service.

1.2 Service Trial Objectives

The major objectives of the services trial are:

- 1) to better define government electronic office communication requirements;
- 2) to identify the basic common service requirements and other telecommunication parameters which are the most suitable to meet the administrative needs of the government with respect to achieving the best pay-offs in terms of productivity improvement and communications costs;
- 3) to offer integrated office communication services as a trial service to the user departments to support their office communications/automation initiative and to determine the benefits that these services can provide.

2.0 Government Integrated Office Communication Services

- Trial Service

To meet government diversified requirements for office communications and to support user departmental office automation initiatives, GTA's planned telecommunications approach and enhanced telecommunications service is based on the evolution of existing government local telephone services.

The service planning direction is to evolve these new services:

- as an incremental service to existing government telephone services via the existing telecommunication infrastructure, wherever practical (i.e. switching systems and in-house wiring etc.) and
- to provide communications connectivity (Gateway) service for users of government telecommunication services, to information systems to which they are permitted access.

The telecommunications approach to be evaluated in the proposed trial service should have the following attributes:

- cost-effectiveness (marginal costing)
- government-wide and departmental accessibility and communications (networking)
- common government infrastructure (Gateway) for access to departmental and other information systems and services
- ease and flexibility to implement, maintain, and expand.

The integrated office communications trial service proposed will be implemented for Transport Canada to determine the benefits and capabilities of these services to meet its stated user requirements and to better appraise future needs and solutions.

2.1 User Requirements - Transport Canada (TC)

(Ref. Appendix A - User Requirements)

2.1.1 Applications

Two office communications/automation applications for the trial service were identified by Transport Canada.

- Information Handling in Airworthiness (Transport-Air) and
- Communications (Messaging and document control) and management support (in Airworthiness)

2.1.2 Functional Requirements

Functional requirements for the chosen office communication applications were identified by Transport Canada (attached as Appendix A). The proposed service based on the use of the Northern Telecom "Meridian SL-ISN (Integrated Service Network)" should provide the essential services and capabilities, as identified in section 2.2 for TC (Airworthiness) applications.

2.2 Trial Service Capabilities

Services to be provided in the trial can be summarized as follows:

- (1) For Transport Canada (Airworthiness Branch) users in Ottawa equipped with terminal (VT-100 or equivalent) and associated telephone set will be able to access the following functions:

- a) Voice (Telephony) Business Calling Features
- b) Electronic Directory
- c) Voice Messaging
- d) Medium Data Rate (Local Area Network) Gateway Services
such as X.25 Gateway, and 3270 Gateway

e) Value Added Information Services, including

- Text Messaging
- Integrated Voice/Text Messaging
- Forms
- Filing
- Printing
- Multi-media calling
- "Reach-thru" (database access) and
- Computing (Xenix based) Services

(2) For TC users in Toronto and other locations all the services as described in 2.2 (1) with the exception of voice telephony, Integrated Voice/Text Messaging and Multi-media calling will be accessible.

(3) A general (NT) description of the value added services is attached herewith as Appendix (B). Further information will be forwarded to TC on request.

2.3 Evaluation Plan

2.3.1 Evaluation - Overall Government Trial Services

As part of the Trial Service, GTA intends to implement an evaluation program. The concept of the GTA service evaluation activity is described in Appendix C. While the service evaluation program is GTA's responsibility, GTA expects cooperation from TC for user support and inputs to carry out the evaluation.

2.3.2 Evaluation Plan - Transport Canada

As requested by Transport Canada, GTA has included in this proposal, as Appendix D, for consideration and implementation by Transport Canada, a proposed evaluation plan for the TC Airworthiness Branch. While TC is responsible for its own evaluation program, GTA will be pleased to cooperate with and assist the Transport Canada Productivity Team in their evaluation activities.

2.4 Trial Project Organization & Milestones

2.4.1 Project Organization

The proposed project organization, as shown in Figures 1 and 2 depicts respectively the Project Management Coordination Committee and the Working Groups in the Project Organization.

The Project Management Coordination Committee will be responsible for approving the implementation.

2.4.2 Milestones

- Contract Award (End of April 1985)
 - Upon receipt of authorization from its client departments, GTA will negotiate with NT for a firm proposal for the provisioning of the trial services based on the Meridian SL-ISN system.
- Service Implementation and Commissioning (Aug.-Oct. 1985)
 - Other milestones such as user training, etc., will be negotiated with Northern Telecom, in consultation with Transport Canada.

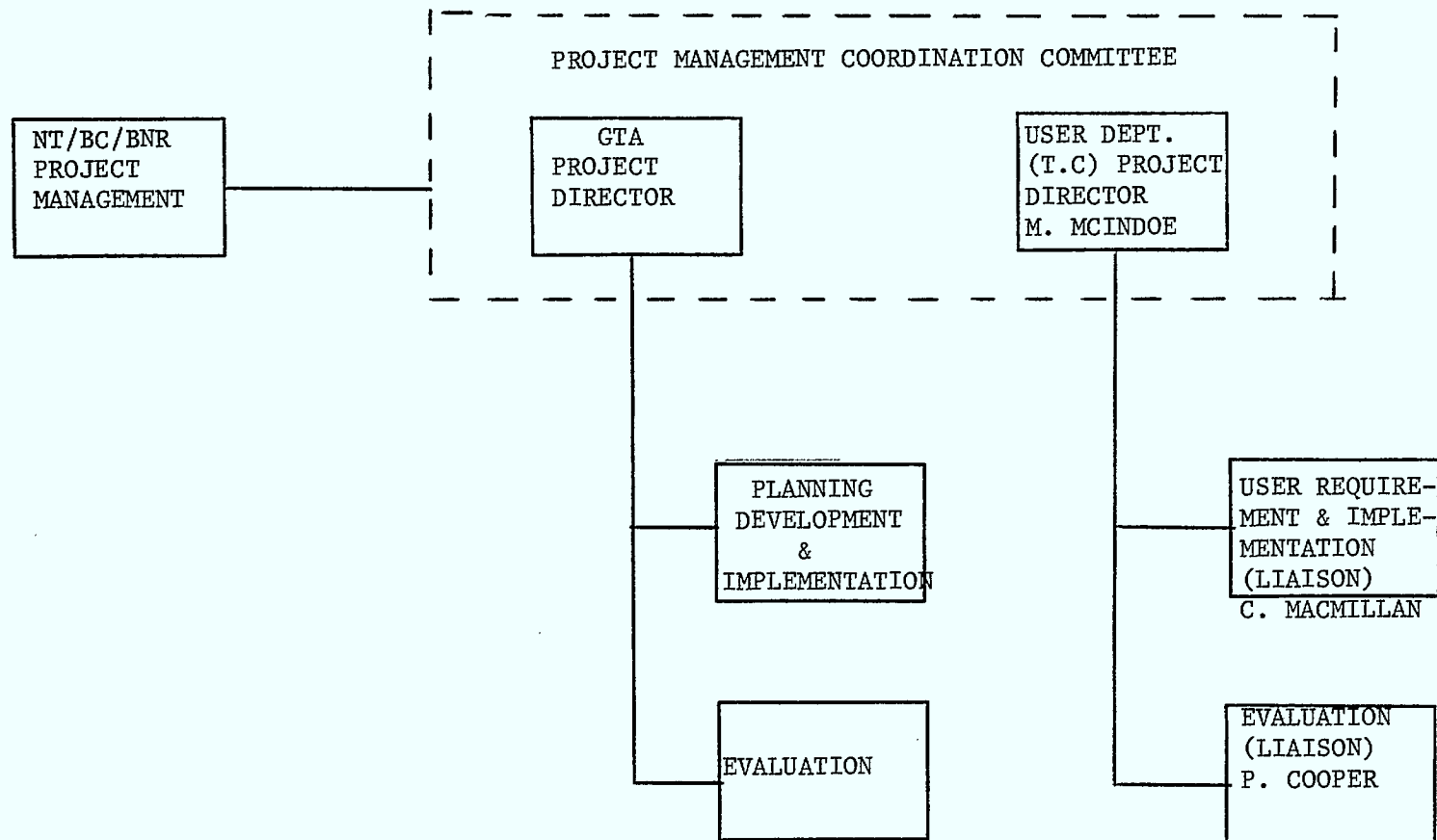


FIGURE 1. TRIAL SERVICE PLANNING & MANAGEMENT ORGANIZATION

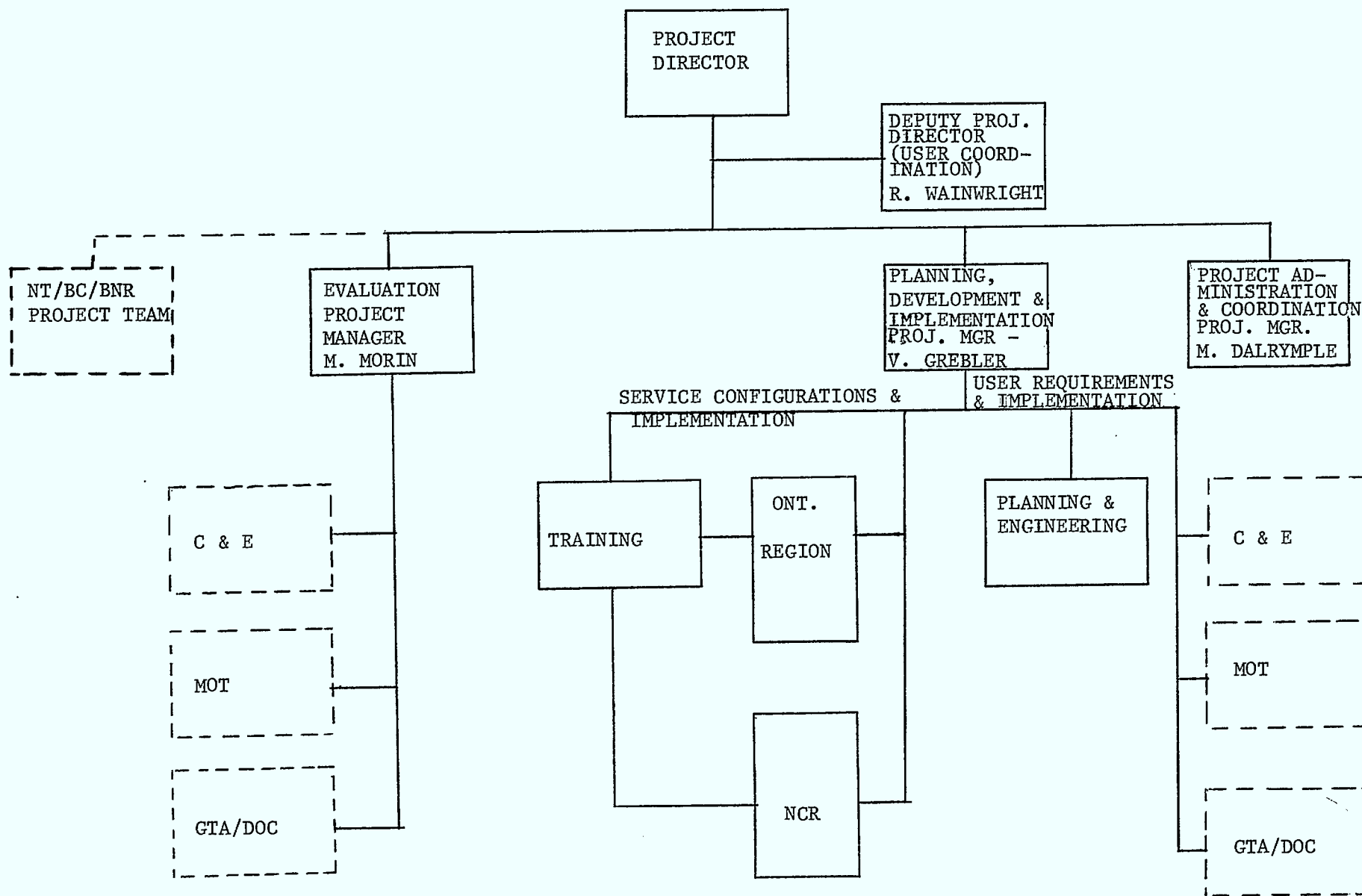


FIGURE 2. GTA PROJECT ORGANIZATION

- Trial Service Duration

The trial service scheduled to commence in Sept./Oct. 1985 has a duration of 12 months renewable at the end of this period up to a maximum of 6 additional months.

3.0 Budgetary Prices

- (1) For the proposed services as described in section 2.2 (1) and 2.2 (2) the budgetary price is \$150.00 \pm 15% per user workstation per month for the duration of the trial.

This price is for the provisioning of the services only and does not include the cost of user terminals (VT-100 or equivalent) (and other user provided equipment eg. data sets, printers, and optical character readers (OCR)), telecommunications costs, and non-recurring installation charges.

- (2) For this trial, there will be telecommunication costs to permit users in Transport Canada in Toronto to access the services in Ottawa and to connect Ottawa users to the "server". The inter-city telecommunication costs vary depending on the type of telecommunication method chosen (i.e. dedicated data circuits, packet switched data network service, dial-up GTA intercity circuit facilities, etc.) and the transmission speed. A preliminary estimate of these telecommunication costs for Transport Canada is in the \$ 6000.00 range per month.
- (3) For a total population of 71 workstations identified by T.C. in Ottawa and Toronto, the total budgetary price for the service including preliminary telecommunications estimates is approximately \$17000.00 \pm 15% per month.
- (4) In addition a preliminary estimate for Transport Canada for non-recurring charges for installation in Ottawa and Toronto is \$ 25000.00.

4.0 Proposed Action Plan

The following action plan is proposed:

- (1) Transport Canada to authorize G.T.A. to proceed with the implementation of the trial service for T.C. and the associated telecommunications services.
 - The authorized maximum expenditure (GTA billing to TC) level is \$ 17000.00 \pm 15% per month for the duration of the trial.
 - Transport Canada will also reimburse GTA for the actual cost for the installation charges.
 - Transport Canada to forward to GTA its authorization cost code for this trial service.
- (2) GTA to negotiate with NT for the trial service which will be based on a NT proposal including detailed description of the services to be provided to meet TC requirements. TC will be consulted with respect to these service capabilities.
- (3) GTA to seek further authorization from Transport Canada, prior to contract should the final costs exceed the preliminary estimate as stated in Section (1) above.
- (4) Transport Canada to confirm participation of the T.C. personnel named in the proposed Project Planning Management Organization (Section 2.4 Figure 1).

APPENDIX A

User Requirements

- Transport Canada

I) Applications

- a) Information Handling in Airworthiness (Transport-Air)
- b) Communications (Messaging and document control) and management support (in Airworthiness)

II) Functional Requirements

1. HO/Region Information Input

To ensure that all incoming mail (with certain exceptions such as large volumous documents) be entered and filed in on-line storage for subsequent retrieval by one or more workstations. Such documents should undergo some automatic input such as OCR or digitization. Electronic identification-coding requirements include the following:

- Brief Subject Identification
- File Reference Number
- Day/Month/Year
- Date and Time sequence in hours and minutes
- Subject and File Indexes
- Procedural Instructions and "Help" Facilities

2. Workstation Electronic "In Basket"

Following from Number 1 is the requirement to:

- Receive and store messages in an electronic "In Basket" at each workstation.
- Recover and view information linked (i.e., "Appended") to messages.
- Insert if needed, a target response completion date - unless already set out in message.
- One stroke "BF" by date and time for message and/or appended content.
- PC workstation file buffering capability to eliminate any response time problems i.e., the PC must interact with the "Main Frame" and user in their respective real times.

Storage capacity for (a) has not yet been fully explored, but as a rough estimate 1 to 1.5 megabytes per user is likely sufficient - at least initially.

3. Word Processing and e-data printing and e-mail and messages

A high speed letter quality printer capability is recommended for the branch. The printer should be linked to all management level workstations. The ability to key stroke for final copy from each workstation is a requirement. This printer must also have a built in queing capability. A means of advising the user of print completion is also needed.

Either a DOT Matrix printer or "Near Letter Quality" printer is recommended for each division. This should be sufficient for information to be printed and distributed to other than the public domain, Executive Transport Canada levels or, other government departments or agencies. The printer should be located at the manager's secretary workstation for both his use and that of his staff.

There are a number of mandatory requirements in respect of e-mail and message communications. Some, because of their importance, are identified separately in this report. A basic requirement is ability to forward e-mail and messages to one or more of the networked stations within headquarters and the pilot regions. The same requirements applies to receiving.

4. Voice/Screen Integration

An adjunct to this requirement, and a most important one, is provision of integrated voice/data capability at each workstation. In short, there is a mandatory requirement to be able to conduct screen/voice meetings simultaneously between two or more workstations within headquarters or region. For example, an OPI discusses an e-document with several other workstations; revises changes on screen, forwards to three other workstations for viewing and, requests voice input from all three workstations to confirm agreements to revisions as noted. This is a mandatory system requirement for each workstation. Without, system flexibility would be seriously impaired.

5. Multi-Tasking

There must be a built in capability to operate in more than one program mode at a time e.g., printing, e-mail and message receipt, and word processing - to mention a few. This function is an absolute requirement.

6. Sign On/Sign Off Password

"Sign On" password is an automatic "M" requirement. ("Sign Off" authorization function by one or several managers and or specialists). One alternative currently employed is to display a name or names locked to a password i.e., a person's name cannot be entered in an approval block unless entered by the person authorized to sign off.

An alternative option is to append a written signature with an e-pen directly on screen. This is a preferred option. It should be researched as to availability and cost/effectiveness when equipment/software options are examined for this project.

The requirement for shared and/or non-shared access has not been confirmed at this time. There will however, be a requirement for this function.

7. Comment Insertion (Windowing or Split Screen Mode)

There is a mandatory requirement to send, receive and display / considered comments on any e-document from one or more workstations. A function required is one which opens up paragraphs for comments insertion (including "Sign Offs" as previously described). Use of the split-screen function is an improved alternative. Limiting this requirement to one or the other of the above, addresses only half the total requirements. The manager may very well wish to data enter a revised e-document while undertaking an intermittent review of both "First Draft" and comments. The facility to "Window In" the word processing program would avoid writing hardcopy followed by data entry. Alternatively the ability to B.F. and instantly recover for reference (while in the W.P. mode) is another alternative. The above requirements exist whatever software function is selected as a solution.

8. E-File Search and Retrieve

The requirement to file, search and retrieve e-messages and mail from and e-in basket has already been addressed. The same requirement applies to an on line data base. This includes departmental e-files and key activities now being identified for prior inclusion in the data base - either totally or with an index as a minimum requirement.

Initially on-line storage access is unlikely to be a major concern but, within a year or two access demands are likely to increase significantly. Simultaneous access needs for the same data could pose a future problem and, should be taken into account to provide maximum system flexibility.

Software should be integrated in a manner most likely to reduce or avoid several separate program commands i.e., use the same pattern or commands to the maximum extent possible for most commonly used programs.

9. Work File Function (Offline diskette use)

Staff in HQ and regions work on several projects at a time, - anywhere from three to as many as 10 or 12. There is a massive accumulation of paper in most files. About 25% of the volume or each file is relevant at any given time e.g., last working drafts and reference material.

It is absolutely essential to have the facility to compose, revise, edit drafts and, establish personal index's and storage capacity for reference material.

10. Spread Sheet Design and Display

This function should be available to all workstations as an on line program. It will be particularly useful in preparation of listings, audit reports and the like. Once available it is likely to be used extensively.

11. Correspondence Control

Tracking assignments is an essential management function. It must be accommodated in any O.A. project.

12. Calendering/Scheduling/Meetings/Appointments

The facility to interrogate scheduled meetings and, at both levels, be able to adjust the schedules of subordinates as appropriate. The above applies as well to daily agenda's including a requirement to file and store for future recovery.

13. B.F. Capability

An obvious essential requirement. It is also referred to elsewhere in these requirements.

14. List/Phone/Directory

The ability to access such data with one key stroke would be a definite advantage. This facility, or near equivalent should be considered.

15. Portable Input Device

Portable input devices such as "Whisper Writer" should be included as part of the final equipment acquisitions for staff "on the road". Users should have the same functional capabilities they have at the office, also the same user ID.

16. External Communications

Access to public data networks and to GEMS/ENVOY 100 for electronic messaging applications, including auto-delivery mailbox is also required.

17. Reachthrough Applications

Access to IBM mainframe for project management and data base applications is required utilizing IBM 3270-type workstation protocol.

III. User Group Location and User Distribution

TRANSPORT CANADA/AIRWORTHINESS

User Group	Location	Floor	Application(s)	No. of Users (ID) on IOS	No. of terminals	Remarks
MOT HQ	Headquarters Centennial Tower 200 Kent St. Ottawa, Ontario	7	I (a) (b)	95	53	the mix of NT (Alpha) and other terminals is yet to be determined.
MOT Ont. Region	Ontario Regional Office 4900 Yonge St. Toronto, Ontario	3 or 4	I (a) (b)	39	18	Some of the terminals could be intelligent workstations such as IBM PC.
MOT Que. Region	Quebec Regional Office (Dorval Airport)	one floor	I (a) (b)	37	17	* Currently desired by Transport but not scheduled for initial phase as Bilingual Software is unavailable on the first release.

* PRICE & CONFIGURATION TO BE PROVIDED WITH THE INITIAL PROPOSAL.

APPENDIX B

Meridian SL-1's package of innovative Information Services offer unique and powerful ways to serve your communications, information and computing needs. You have probably found that current products adequately solve certain specific, singular information needs, but you are seeking innovative technology which will streamline your business communications and information access activities.

Information Services will overcome these common inefficiencies:

- Your corporate directory (and other resource references) is often outdated or lost. Even when first issued, it's difficult to locate names that are difficult to spell or that could have one of several spellings. As well, you often know the title or department of someone you want to call but not the name.

- You frequently play "telephone tag" due to meetings and time zone differences and your communications suffer because of it.

- A single-media messaging system does not adequately solve the "telephone tag" problem. A voice messaging system is restrictive - long messages are inconvenient for both the sender and receiver. Some messages, such as those with data analyses, are not feasible. Text messaging systems require everything to be typed and often fail to effectively communicate the message.

- Office forms create delays and are expensive: printing expenses are excessive, especially when a form is revised; important forms are frequently out of stock; workers frequently make errors in completing or routing the forms; and perhaps the most frustrating problem with paper forms is that they are often delayed in the mail or even lost.

- You frequently need to discuss a paper - an analysis, document or memo - with an associate but only one of you has a copy. You must plan to meet or attempt to review the paper with one person reading it to the other over the telephone. This is ineffective and inefficient.

- When accessing a corporate system for information, you must take manual notes. If you need to convey them to others, you must type a memo or copy a printout and then mail the information. This is costly and slow.

- You would need to use a spreadsheet program or a simple word processing package but someone else is using the departmental personal computer and you cannot justify the purchase of your own.

Information Services are designed to eliminate these and similar business communications frustrations. These services will assist all members of your organization. The system commands are simple, logical and

consistent; the system is easy to learn, with on-line, task-specific assistance. Most importantly, the services described below are not discrete but are integrated. They logically present a product which will dramatically improve the effectiveness of employees' communications activities.

MESSAGING

Offering much more than traditional voice or text messaging systems, MESSAGING integrates voice and text. You can send voice or text to any other user on the Meridian SL-1, and, in the future, users of messaging networks conforming to the emerging X.400 electronic mail standard. You can add voice annotations to a message you create or to one you receive from someone else.

Users who do not want a computer terminal can benefit from the voice-only interface to MESSAGING. Voice-only messaging is superior to other similar products and includes such features as message headers and indexing to facilitate message retrieval, pause suppression and personal profile alternatives.

MESSAGING is integrated with the other Information Services, such as DIRECTORY, FORMS, the Resource Management services (Filing, Printing) and the basic telephone features. For example, you can attach messages to forms, files or other messages and send them to one or more people using DIRECTORY's automatic addressing capability. With the Meridian M4020, a personal computer or terminal, you can automatically call a message sender. When you want a paper copy, you just print one. The M4020 fully integrates the Meridian SL-1's telephone features with screen and keyboard assistance.

DIRECTORY

DIRECTORY is more than just an ordinary corporate phone book placed on line. It automates the searching and dialing tasks for you. It also provides all the information that your printed phone book does, plus it provides a personal directory of names and a comprehensive information base for all the people, departments and computer services in your organization. You can even add often-used names and numbers from outside your organization.

Again, both the organization directory and the personal directory are integrated with the other Information Services. When you send a message, DIRECTORY will validate the name you type in and address the message for you. When you can't remember how to spell a name that you want to look up, call or send a message

to, you can use an approximate matching techniques to find the right entry. Once you have selected the person or resource in DIRECTORY, a phone call or message can be initiated with a single keystroke.

ACCESS

With ACCESS, you can rapidly and effortlessly access a world of information and a wide range of computer services through the Information Services software or DIRECTORY. Because ACCESS handles basic baud rate, code and protocol conversions, it makes accessing different computers easy even for the novice. Even the knowledgeable computer user will find ACCESS very helpful.

All you have to do after you log into Information Services is select ACCESS from a service menu or select a computer service entry from DIRECTORY. Either way, ACCESS handles the call, dialing up the computer service and, if you provide log-on sequences in the DIRECTORY, even logging on for you. Once logged on, you interact with the computer service normally. ACCESS also provides IBM 3270 and DEC VT100* compatibility as needed. And you can retain a session file of an ACCESS call for later use with other information Services, such as MESSAGING, Filing and Printing.

*VT100 is a trademark of Digital Equipment Corporation.

FORMS

With the FORMS service, you can automate many office procedures. Forms are created by your own forms designer and are stored on line where it can be obtained by whoever needs it. Because they are stored on line, the forms are easy to fill out and are routed automatically by the system. The forms designer can write on-line help for the form and its fields to assist anyone filling out the form. As the forms are on line, you don't incur printing costs to have up-to-date forms available all the time.

FORMS has many unique features that protect you. Security is assured because each user has his own electronic signature password. Once you sign with this signature password, you lock associated data fields. No one can change these fields without erasing your signature. FORMS helps you complete each form

accurately by validating and calculating fields as required. When a form is ready to be sent to someone else, the service accelerates its processing via the automatic routing and tracking capabilities.

SHARE

SHARE offers desk-to-desk multimedia telephone calling. Coworkers can now easily consult, review or edit many types of information from their individual offices. Once a phone call is in progress, if both parties are logged into Information Services, either one can offer to share the information on his terminal screen so that both workers can display the same information. Once a screen is shared, either party can act on the screen and all screen changes are transmitted to both screens. SHARE automatically performs necessary speed and protocol conversions.

COMPUTING

COMPUTING enables you to conveniently access a wide range of personal productivity programs.

You can select the programs you need and easily add more programs at any time.

Initial programs include:

- a software selection tool
- word processing
- a spreadsheet planning tool
- calendar management
- data base management system

The programs selected for use with COMPUTING operate on the XENIX*-based operating system. Because you can use these programs from your existing VT100-compatible terminals, you do not have to purchase special equipment to access them.

*XENIX is a trademark of Microsoft Corporation.



Not only do you have shared access to a wide range of programs, but through the integration of the Meridian SL-1 Integrated Services Network, you add many capabilities. Information generated by these programs can easily be conveyed to other users through MESSAGING, printed, or filed in your electronic file cabinets for later reference.

Resource Management

Resource Management is a set of services carefully designed to facilitate your use of the Information Services.

On-line Help. On-line Help assists you when you need it – just request Help from your terminal. Help is context-sensitive; that is, it relates to the function you are currently performing. There are two levels of help: general summaries of your context and fully detailed descriptions of the contexts, commands and fields.

On-Line User Guide. Your user guide is on line, where it is easy to access for "how-to" instructions, system concepts and definitions. All the information is presented clearly and in a format designed for reading on your terminal screen. You are introduced to the on-line environment by a concise printed guide called "Getting Started".

Filing. The Filing service lets you easily store and retrieve multimedia files – voice or text files or files consisting of both recorded voice and text. Any can have multiple tags, up to 256 per cabinet, to facilitate retrieval. All reference materials are quickly identified and easily retrieved.

You may define your own personal cabinet, group cabinets (shared by specified users) and certain public cabinets (for use by everyone in your organization). Access to cabinets can be controlled by several levels of access (read only, read/write, read only-nonprivate). You can give others permission to access your cabinet.

Printing. Anything you see on your terminal screen can be printed quickly, efficiently and by the printer of your choice. The printing service allows effective management of your organization's printing requirements, providing the flexibility of individually located printers with the expense reduction of a central printing facility.

Notes. You can perform simple text editing jobs such as writing notes using this feature. If you prefer, you can also record verbal notes. You can insert and delete words, move them around and, with windowing, work on more than one note at a time.

APPENDIX C

Preliminary Concepts of Evaluation
for GTA's Field Trial of an
Integrated Office System

DDE #84- -027

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Government Telecommunications Agency
3 November 1984

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I. EVALUATION

1.1 Introduction

Evaluation was treated, a few decades ago, as an after-the-fact process. It meant that an observer was brought in, after the implementation of a new policy, program or service, to describe the present situation and make recommendations.

That approach presented a major limitation. The study did not contain objective documentation of the situation before the implementation and consequently no objective comparison of the "before and after" situations. Therefore, it was difficult, if not impossible, to assess the extent of the impact of that event. Such an approach invited those against the changes to criticize the decision and to question its motives.

1.2 Evaluation Research

Since the implementation of a trial in the field implied the observation of a dynamic population submitted to many different influences other than these of the trial and not under the direct control of the observer, evaluation research has evolved from the development of quasi-experimental designs. Compared to experimental designs where the population is studied in a controlled environment and where the confounding variables are controlled to a feasible extent, quasi-experimental designs are applied to dynamic populations.

The best quasi-experimental design, the one that ensures most control of the possible biasing variables in a dynamic population as in field trials, is a pre-trial/post-trial serial design with a control group.

Such a design implies the same pre-requisites as an experimental design, namely

- a) the definition of the goal of the research or trial;
- b) the expression of the goal in its specific measurable variables.

The essence of the design involves the following phases:

- a) Pre-trial - Before the implementation, an objective measurement of the defined variables is done. This data collection is not done only once but repeated at intervals (serial) before the implementation phase. These repeated measures allow the observer to establish a baseline for the situation before any intervention. This baseline is determined for both the experimental group who is going to be submitted to the trial and the control group who is not.
- b) Implementation - During this phase, the experimental group is submitted to the trial but no intervention is done to the control group.
- c) Post-Trial - After the trial has been running for a period of time, the same variables measured during the pre-trial are measured again with the same tools and procedures as previously. Here again the data collection is repeated at intervals (serial). This ensures that the results and the conclusions reflect a constant effect of the intervention. During this phase, the control group is submitted to the same measurement as the trial or experimental group.

	Pre-Trial Measures			Implementation	Post-Trial Measures		
Trial Group	X	X	X	-----	X	X	X
Control Group	X	X	X		X	X	X

Fig. 1.2 Pre- and Post Trial serial design with control group

Control Group

The control and the trial groups should be part of the same population. It means taking one set and dividing it in two subsets: one being submitted to the trial and the other not.

The control group is used as a measure of the influences that affect the population but that are not directly measured in the trial. For example, in an office, there could be a change in management, in policy or in procedures which could have a bearing on the variables measured but are not themselves directly measured. Thus any effects, other than those of the trial, are distributed on the whole population which includes both the control and the experimental or trial groups.

Sometimes it is difficult to establish a control group either because the population to be studied is too small to be separated in halves, or all the members of the population have interaction with one another and cannot be divided, or there is no group with the same characteristics as the trial group. The control group is at times omitted. In that case, the observer has to double vigilance and note all the influences in the environment that may affect the final results.

Serial Measurement

The observer shouldn't compromise on the repeated measures either in the pre-trial or in the post-trial. By taking only one measure in either phase, the observer may be measuring a transitional or temporary effect. With repeated measures taken at intervals it is possible to determine a mean, ie. a baseline for the situation.

II Office Automation

2.1 Office Automation and Productivity

With the growth of the third sector of the economy, the service sector, pertinent and timely information is money. To enhance office productivity and to maximize office work effectiveness become more imperative. Thus, office automation is a promising option. But,

changing a conventional office to an electronic office is very expensive in time and money involved. For that reason, in planning for office automation, a return on investment has to be estimated. Two approaches have been described by Tapscott et al.¹ savings. One emphasizes time and cost (efficiency) and, the other emphasizes value added activities (effectiveness).

Table 2.1 Distinctions between efficiency and effectiveness approaches to office automation.

Efficiency	Effectiveness
- dollar per unit of output	- production of the right output
- performance of a given task as well as possible in relation to some predefined performance criterion	- identification of what should be done
- "doing things right"	- "doing the things right"
- can be measured in terms of savings in cost and time (staffing)	- requires an understanding of the variables that affect performance to be measured
- can be key concern in stable environment	- key concern in unstable environment
- can be defined, described and measured internally to the organization	- is best defined, described and measured in terms of its external impacts

These two approaches are not mutually exclusive. Both elements of efficiency and effectiveness have to be considered when planning for office automation. At a professional level, it may be easier to identify a product and measure its production time and cost and thus evaluate office automation in terms of efficiency. At the managerial

1. D. Tapscott, B. Shak and D. Mafarlane, Measuring the Impact of Office Information Communication System, Bell Northern Software Research, 1979.

level, a product is less identifiable. In that case, effectiveness is preponderant since office automation will be evaluated according to its facilitation of getting to the right information, as defined by the manager, in a timely fashion, as defined by the external impact of the product.

Automation offers the opportunity to increase productivity (efficiency and effectiveness) of the office if used for the right reason. For example, in an office using inefficient file indexing and cumbersome procedures and/or multiplying forms unnecessarily, automation will only process "the wrong information at a faster rate". The decision to automate should be an occasion to look closely at what is happening in the office (is it the right output?) and how it is done (is the output done right?). If any modifications are required it should be done before the introduction of automation.

2.2 Evaluation Research of Office Automation

The evaluation should be based on a practical methodology that meets two criteria.

- a) It must involve the members of the organization in a process that is effective on two aspects, namely, eliciting important behavioural information relevant to system effectiveness and acceptability, and, engaging the staff commitment to the strategy of office automation.
- b) The methodology must include the collection of quantitative information needed for the design and economic evaluation.

Phase I - Users' needs

By doing an interview¹ or giving a questionnaire² to each member of the organization, it is possible to identify users' needs and the areas where the implementation of automation should be concentrated. During this phase, the data collection should cover the following points.

- 1- Functions. This covers the functions of the organization and the individuals' functions within the organization. This allows to determine the level of the members (support staff, professionals, managers) and the raison d'être of the organization.
- 2- Outputs or products. For the professionals, it is easier to identify a product such as analyses, reports, forms approval and processing, etc., while for the managers the outputs are more diversified and less identifiable.
- 3- Sources of information. This refers, for both the professionals and the managers, to the sources of information such as internal files, databases, input from other groups, etc.
- 4- Procedures. This applies more to the professionals. It is the identification of all the steps involved from beginning to end to produce the output (s).
- 5- Communications. This includes such information as with whom the professionals and managers are in communication and what type of media they are using - phone, mail, electronic mail, telex, etc. Here, the functional group as well as the media most frequently used can be identified for implementation purposes.

1. Interviews take more time than a questionnaire but it allows for a more in-depth collect of data.
2. Questionnaires take more time and efforts to design than interviews but they are faster to administrate. A varying percentage of respondents may fail to fill in the questionnaire.

- 6- Sources of delay or hindrance to productivity. Two forms of delay namely, the transfer of information and access to the sources of information can be reduced by automation. Any delays due to internal decision or organizational procedures will not be reduced with automation. This should be worked out internally before the implementation starts.
- 7- Identification of ways for increasing productivity. The members of the organization can point to the areas where an increase in productivity could be expected if the right tools were implemented. At this point, the observer knows what to measure and can design the tools to measure it.
- 8- Attitudes towards office automation. For some, office automation suscitates fear while for others, it is the solution to everything. The results of this measurement will help in the development of adequate training tools.

Phase II Pre-Trial Measurements

What has been identified as a potential for increased office productivity should be measured. For managers, whose functions are concerned more with getting and relaying information, a log could be designed to collect the following: type of information, medium used, sources of information, and persons with whom they are in communication. The log should be filled at intervals in high, medium and low periods of activity. For professionals, where a specific product can be identified, measurement could be taken of the process from beginning to end. This data collection should be repeated at different periods of activity. If the product evolves over a long period of time such as a year, the elapsed time could be determined with the aid of the professionals at every steps of the production and if possible corroboration of the results could be done by using archival data.

Phase III - Implementation

This period involves the introduction of automation while maintaining the manual system. It is also a period of training and learning. Until the manual system is totally cut over to automation, any measure of the efficiency of the system is hard to take. During this period it is of prime importance to survey users' attitudes towards the system and quality of working life and note every disruption or effect influencing the implementation of the service.

Phase IV - Post-trial Measurements

By using the same tools as in the pre-trial measurements, productivity is measured and users' attitudes towards the system are surveyed. The results of the pre-trial & post-trial productivity are compared. At this point, the organization should make a cost-benefit analysis of automation.

III GTA's Field Trial of an Integrated Office System

3.1 Participants' Goals and Parameters Involved

There are three parties involved in the GTA's field trial: GTA, the vendor (Northern Telecom), and the user departments (GTA, C & E and MOT). Each party has a different motive to participate in the field trial and the goals that everyone wants to achieve is going to determine other parameters to be studied besides productivity.

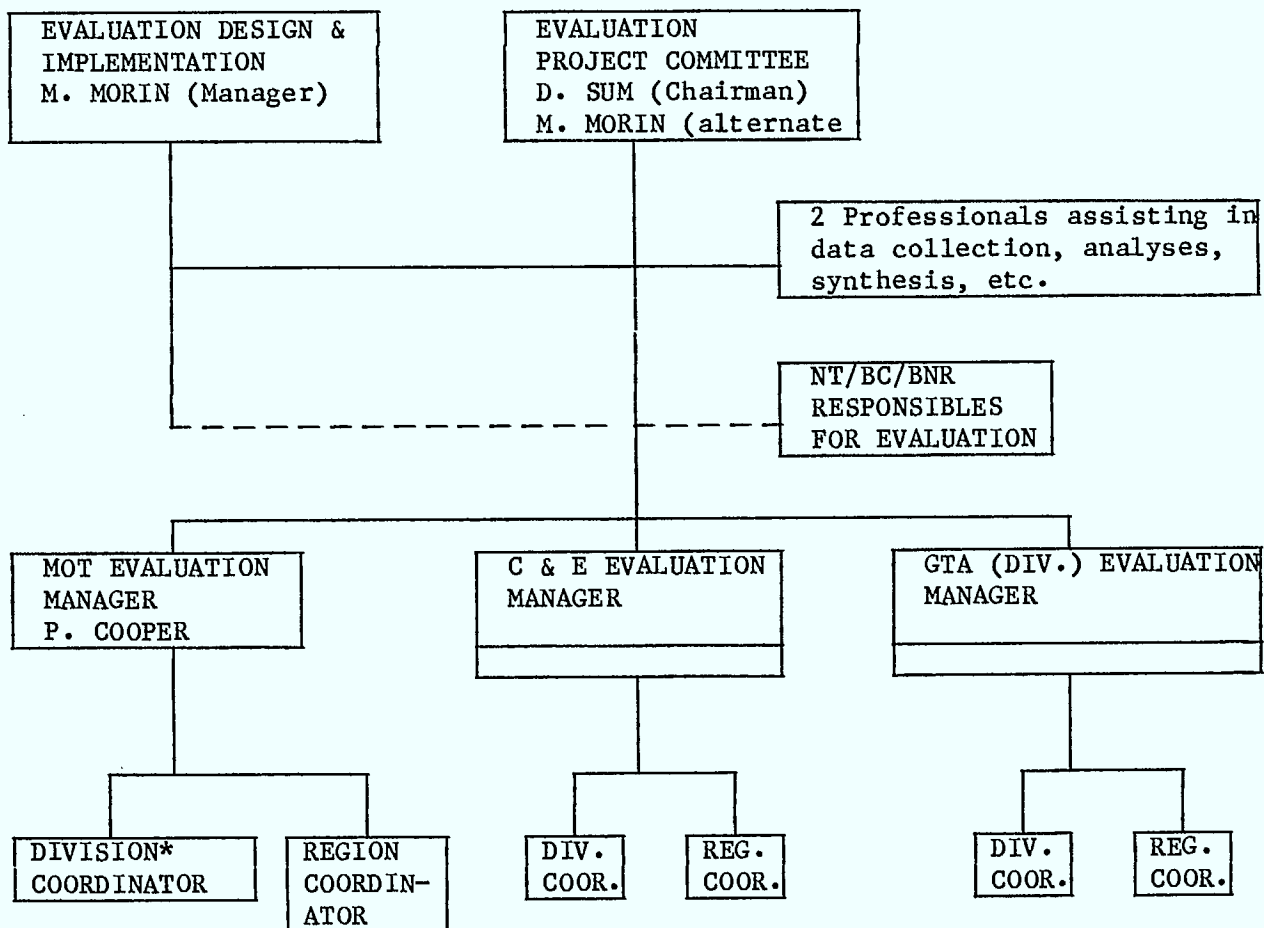
GTA's goal is to evaluate an integrated office system which eventually could be utilized to develop a shared service in bureautics for all government departments. The main parameters to be considered here are the performance of the system, usage of the system and users' perception of the usefulness of the system.

The vendor's goal is to assess the performance of their integrated office system in a real office environment which system will be subsequently marketed. The main parameters should be the same as for GTA with an added variable being the process of implementation.

The users' goal is increased productivity in their job. The main parameters are effectiveness, efficiency and cost-benefit. An added variable is quality of working life since it has bearing on the productivity factor.

3.2 Evaluation Team and Proposed Timeframe

a) Structure



* There should be one person responsible for the evaluation in each division/region. For large divisions, there should be one person responsible per 12 users, approximately.

b) Proposed Timeframe*

I EXPERIMENTAL DESIGN & PROCEDURES

Nov Dec Jan Feb Mar Apr May Jun Jul Aug

1.1 Report

II PRE-TRIAL

2.1 Assessment of users' needs

2.1.1 Design of questions

_____ 21

2.1.2 Pretest of questions

24____ 6

2.1.3 Distribution of questionnaires or interviews

7____ 1

2.2 Productivity measurement

2.2.1 Design of prod. meas.

4____ 1

4____ 29 1____ 31 1____ 31

2.2.2 Data collection

1____ 31

2.3 Pre-trial report

III IMPLEMENTATION

SEPT 85 OCT NOV DEC JAN 86 FEB MAR

3.1 Data collection on usage, system performance

16_____ cont'd

3.2 Survey users' attitudes

1____ 30

1____ 31

1____ 28

IV POST-TRIAL

4.1 Productivity (At intervals, if appropriate, between
Measurement April 1986 and November 1986.

4.2 Users' Attitude (id.)

V REPORTING

5.1 First post-trial report April 1, 1986

5.2 Final report December 31, 1986

- * For Customs and Excise, since this is the continuation of a field trial, the tools for assessment that are being used now could be used during the next field trial. In that way, the data on the present field trial could be used, and it would ensure a certain continuity, even if they add new users. A separate schedule is therefore being considered.

APPENDIX D

PROPOSED DETAILED EVALUATION PLAN
FOR THE AIRWORTHINESS BRANCH (HQ)
OF TRANSPORT CANADA:
OFFICE AUTOMATION FIELD TRIAL

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I- Introduction

The Airworthiness Branch of Transport Canada is considering a field trial of an integrated office communications service (IOS) to increase their productivity and enhance their service to the aviation industry.

At least four reports were produced in the last year assessing the Branch's needs for office automation. The present discussion paper is based partly on information taken from these reports and from discussions with some Transport Canada officials.

The purpose of this paper is to identify a proposed approach within the GTA/TC Evaluation Program to assess the impact of various measures of productivity in the Airworthiness Branch with the implementation of the Government integrated communications (trial) system. The following lists the pertinent variables which should be examined in the evaluation of the field trial. Secondly, it proposes methods to be followed in order to measure each variable and the hypothesized conclusions which could be drawn regarding the impact of the IOS.

Since an integrated office system is aimed at increased professional productivity, the first three variables described hereafter are concerned with this aspect of productivity. The fourth variable deals with support personnel productivity related to the professionals' productivity. The fifth variable looks at the attitude of the Branch's personnel vis-à-vis office automation. And finally, the last variable refers to the usage data of the system after its implementation.

II- Productivity index based on multiple outputs

In a previous report (Ali, Sept. 1984), the Branch's productivity index (output/input) showed a slight decrease for 1983/84. The outputs were identified as the number of type approvals (T.A.) issued, the number of Airworthiness directives issued, the number of companies approved; the inputs were identified as the number of aircrafts on register, the number of incoming correspondence related to type approvals and the number of person-years utilized. Instead, it is proposed that the outputs be defined as all of the above, minus the person-years. The amount of incoming correspondence is included in the outputs because each time a piece of mail arrives, an action is required. The input should be defined as the number of person-years utilized. Calculated as such, the Branch's productivity index shows a steady increase for the last three years.

The number of T.As issued and the number of related correspondence (requiring an action from the Branch) is a major activity taking up to 40% of the time of the whole Branch. But the Branch does not determine these numbers, the companies do and their requests depend largely on the state of the economy (Ali, Sept. 1984).

Evaluation considerations

During the field trial, if the number of T.As and related correspondence increase, the productivity index, as previously defined, could be used to measure the efficiency of the Branch and the IOS. If the number stays the same or decreases, the efficiency of the IOS as a whole can't be assessed.

With this type of measurement, if the number of requests increases during the trial, conclusions could be that with office electronic tools, the ratio outputs:person-years utilized was higher than for the previous years. The results could be interpreted in cost-avoidance terms for the Branch since it could consider hiring less people than they would otherwise. But if the number of requests decreases, the conclusions couldn't be that the IOS has not helped the efficiency of the personnel since the amount of work to be accomplished would be less than in previous years. If such is the case, the measurement wouldn't say much about the efficiency of the IOS.

This type of approach doesn't reveal what specific electronic tools were useful in increasing productivity. This would have to be deduced from the usage of the IOS' different applications.

III- Productivity index based on individual outputs

Type approvals (foreign)

(The measurement of this variable is tentative at present, since we haven't yet had access to the files to determine if it could be measured that way.)

In the last 3 years, over a hundred foreign T.As were issued (Ali, Sept. 1984). The average time to issue such a T.A. lies between 6 and 12 months.

Evaluation considerations

The mean () and deviation () from the mean of the time required to issue T.As before the implementation of the IOS could be compared to the mean and deviation of the time involved in the T.A. issue after its implementation.

In this case, it could be determined whether or not the integrated office system has reduced the overall time to process such requests.

The same thing applies here as for the multiple outputs productivity index. The impact of the specific applications of the IOS would have to be deduced from their usage.

IV- Effectiveness & efficiency in document control and management

One major source of aggravation in the Airworthiness Branch is the poor document control and management. Personnel experience time delays in finding documents and sometimes they loose some (Report no. 282-986, March 1983). It is estimated that there are 94,571 pieces of incoming mail per year and 33,605 documents (letters, memos, etc.) produced internally. It is also estimated that support staff spend 299 hours per year looking for documents (Report no. 282-1074).

With the number of documents circulating in the Branch throughout the year, it is easy to understand that delays may be involved in finding documents unless there is an efficient manual system of procedures in place to which each staff person adheres. It is also easy to imagine that some documents may be lost unless the system in place is very effective.

At present, procedures exist but nobody thinks that the system of document management and control is reliable with the result that every project manager establishes his/her own procedures.

The Branch, with the help of Records Management, expects to look at the procedures for document management before the IOS field trial. It is desirable to do so before the IOS field trial because to translate a bad manual system to an electronic one is not going to solve any of the problems.

If this were not done, it would compound the problem since at the time of the trial, the Branch would have two systems running in parallel with the result that it would be even more difficult to know in which system a document is filed and how it is classified.

Evaluation considerations

After the document control and management procedures have been revised and implemented, and before the implementation of the IOS, the effectiveness and the efficiency of these procedures should be measured.

a) Procedures effectiveness

In this case, effectiveness would mean to be able to find, at any given time, any document. Any pertinent document lost would reveal ineffective procedures.

To keep track of the number of documents that are lost before and after the IOS implementation would allow not only to determine the effectiveness of the IOS system as compared to the manual system, but also to determine where the procedures are faulty and how to refine them.

b) Procedures efficiency

The estimate of 299 hours per year spent by support staff looking for documents translates in as many hours of delays in the production of outputs. To these delays, we have to add the delays encountered by the professionals waiting to receive a new copy from the originator if the copy has been lost. (In some cases, it may mean that a professional has to redo the work that s/he had done previously, if no copy of the document was kept.) Two approaches designed to measure the efficiency of the document management (document tracking) procedures will now be discussed.

- i) The first approach is that the project managers, or their secretaries, log in the time required to find any document related to his/her project. Any document lost should be logged in as such and the time to get a new copy should be logged in. The log could be kept for 3 or 4 days (spread out over a few weeks) by each project manager.

The drawback to this approach is that most managers will forget to log in the delays unless the document cannot be found. The results will be a biased sampling which will give a distorted account of the efficiency of the procedures.

- ii) The second approach would be to have an observer present who would be responsible to time the delays involved in finding documents. The observer could take measures for three days for each project manager, spread out during a month.

The drawback are: a) the managers have to cooperate with the observer telling the latter when s/he is looking for documents; b) the managers have to carry out their work with an observer sitting in their office.

The gains are an accurate measure of the efficiency of the procedures.

While the second approach is preferable, the choice will be incumbent to the project managers. The same method used to measure the efficiency of the document management procedures before the IOS implementation will be used after the implementation.

V- Productivity of support personnel

A project (no. 282-1072) was completed by Transport Canada in November 1984 on support personnel activities. It is estimated that 60,568* pages (35 lines per page; 10 words per line) are typed per year. It is estimated that two thirds of the pages produced are for revisions since the Airworthiness Branch uses typewriters to produce their documents instead of word processors.

Evaluation considerations

The time involved in retyping pages because of revisions is equivalent to 4.76 P.Y.* per year assuming a typist works at a rate of 30 words/minute, 7.5 hours a day and 220 days a year.

If word processing capabilities were offered to the support staff, at least 75% of the time involved with the revisions would be freed for other clerical or administrative support activities.

Having word processing capabilities also means that the delays involved in producing outputs would be decreased by the equivalent of 3.75 P.Y. ($4.76 \text{ P.Y.} \times .75$) for the whole Branch. The shortened delays should contribute partly to the decrease of the overall time required to produce the outputs, for example, a foreign T.A. An estimate of its contribution to productivity could be done with the following measurements.

In the pre-implementation phase, the measurement would be taken on a sample of work (letters, memos, etc.). It would involve, after the handwritten copy is given to the secretary, measuring the time it takes until the document is signed.

After the implementation, the measurement would be the same if the professionals handwrite their documents. If they do the initial input on the system, the measurement would involve the time the secretarial staff spend working on the document after it has been inputed. In the case where the secretarial staff is not involved at all, the time would be considered to be zero.

By comparing pre and post implementation on the average time required to process a document after the first draft we would be able to estimate the time and delays saved by word processing capabilities on an integrated office system.

*These estimates include data from both Headquarters and the regions.

VI- Attitude survey

A questionnaire containing three separate parts should be distributed to the Branch personnel before the IOS implementation.

The first part of the questionnaire should deal with the attitude, in general, of the respondents towards office automation.

The second part should assess the respondent's expectations of his/her performance and/or adaptation to an IOS system during the first year of the implementation.

The third part should assess the respondent's expectations of the system's performance during the first year of the implementation, which is the first year of the field trial.

After the implementation, the questionnaire should contain a fourth part to assess the respondent's rating of the effectiveness and efficiency of the different tools part of the IOS.

An attitude survey should serve to corroborate if indeed an office integrated system is effective and efficient.

VII- Usage of the system

The log-in/log-out time for the electronic tools in the system should be taken automatically by the system. These data should be available to the researchers in evaluation to allow a correlation with the results on productivity.

VIII- Conclusions

This plan for evaluation in the Airworthiness Branch in Transport Canada covers activities in HQ but not the activities in the Toronto Region. Since the latter carries on activities different from HQ, we suggest that a separate evaluation plan be designed for the region.

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