Government of Canada
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MERIDIAN SL-1 VOICE-ONLY MESSAGING:

RESULTS OF AN EVALUATION OF A PILOT TRIAL

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GOVERNMENT TELECOMMUNICATIONS AGENCY

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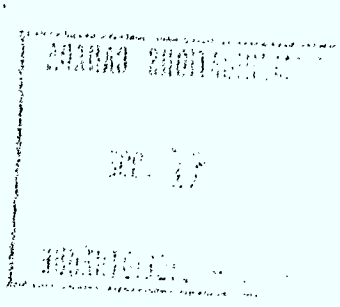

MERIDIAN SL-1 VOICE-ONLY MESSAGING:

RESULTS OF AN EVALUATION OF A PILOT TRIAL

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TABLE OF CONTENTS

PAGES

EXECUTIVE SUMMARY

In order to assess the impact of a voice messaging system (VMS) on telephone calls and messages in the Government, the Government Telecommunications Agency (GTA) introduced in December 1987 Northern Telecom's Meridian SL-1 Voice-Only Messaging System (VOM) in Treasury Board/Finance (TB/Fin) and in GTA.

Northern Telecom's VOM system proved itself to be well designed, containing most of the features that users require from a VMS.

This field trial allowed us to establish a profile of telephonic communications and messages for office workers in the Federal Government. It gave an opportunity to identify a productivity index to measure the impact of a VMS on office work.

Two main recommendations were brought forward as a result of this field trial. First, that a functional communications group be chosen in order to have the necessary critical mass to properly assess all VMS features, and secondly that delays created by telephone tag be used as an index of productivity.

1. INTRODUCTION

It would never occur to anybody to argue with the telephone company when they tell us that using the telephone is "an economical and intelligent way of doing business" and that it is easier to "let your fingers do the walking". Using the telephone for communication is efficient and effective; it is fast, economical, and it allows the transmission of the integral content of verbal communication ... except when the intended party is not available to receive the call and take or give information. In this case, the efficiency is decreased proportionately to the number of telephone calls placed in order for the two parties to establish contact and the time elapsed between the first and the last telephone call when the business transaction is finally concluded.

A voice messaging system (VMS) seems to have a lot to offer to the whole process of telephone communications. It automatically answers the telephone when the party called is unavailable, it can record a relatively long message, and it allows message sending and retrieval anytime from anywhere where there is a touch tone telephone. These characteristics have a lot of potential for messages which don't require dialogue but which are too elaborate to leave with a secretary or a receptionist. It also has a lot of potential for communications which require a dialogue. In this case, the dialogue is not carried on synchronously, but rather with a delay before each intervention. This means that each telephone call in a telephone tag situation, instead of being a call with no content such as "call me back", conveys information which brings business to its conclusion faster.

2. FIELD TRIAL BACKGROUND

In order to assess the impact of a voice messaging system on telephone calls and messages in the Government, the Government Telecommunications Agency (GTA) introduced in December 1986 Northern Telecom's Meridian SL-1 Voice-Only Messaging (VOM) in Treasury Board/Finance (TB/Fin) and in GTA.

At the beginning of the trial, there were a total of 120 participants. There were 41 participants from GTA and 79 from TB/Fin. All of the participants had access to VOM via a Unity II telephone except for 32 participants in TB/Fin who had access to it via the Meridian M4020 integrated voice/text terminal.

The implementation was done gradually from December 1986 to March 1987 and the trial ended September 1987. Therefore, the participants had access to the system for a period ranging from six to nine months. A list of the field trial milestones is included in Appendix A.

Nota bene: VMS refers to Voice Messaging System in general. VOM refers to Northern Telecom's Meridian SL-1 Voice-Only Messaging system in particular.

3. DESCRIPTION OF THE MERIDIAN SL-1 VOM SYSTEM

The VOM system resided in the Packet Transport Equipment that was connected to and fully integrated with a NT SL-1 PABX located on TB premises.

The SL-1 was transparent to the EEWD user, allowing VOM to come automatically into play when a participant was unavailable to take an incoming call.

VOM offered 20 features on the Unity II telephones which enhanced the basic functions of receiving, storing and/or sending messages (see Appendix B for a list of VOM's features). It therefore offered an answering service when the person was absent or on the phone, and it also offered the capability of using this tool for communications purposes.

On the M4020 terminals there were added features such as directory, screen-based telephony and access to GEMS/ENVOY.

4. PRESENTATION TO THE PARTICIPANTS

When all the users were selected, a presentations were given to the participants in order to explain to them the scope of the field trial: the type of equipment which would be installed, the timeframe for the implementation and for the training and finally, what was expected of them as participants in the evaluation of the field trial.

There were three objectives to these presentations:

- to integrate the participants into the field trial process and to make them feel that they were an integral part of the trial (even if they had no say in the choice of the participants);

- to offer a captive audience to the evaluators where they could introduce the concepts of the evaluation, give instructions and start collecting data. This procedure was a time saver for the evaluators since they did not have to meet participants individually;

- to ensure that everybody received the same information concerning the field trial and its evaluation.

The achievement of the first goal will be discussed in Section 9.6 of this report. The second goal was certainly achieved since less than 10% of the participants had to be given instructions about the evaluation on an individual basis. Having all of the participants in groups saved a lot of time for the evaluators. Since most of the participants attended these presentations, it follows that the third goal was achieved and that all received the same information, therefore avoiding the positive or negative rumor mindset.

5. TRAINING

Northern Telecom gave 2 days of training to 12 participants of the trial, 6 participants in GTA and 6 in TB/Fin. Four of these 12 people gave the subsequent training to all the users in their respective departments; they were all coordinators for trouble reporting.

The participants, in small groups of up to eight, received half a day of training on the VOM features. It was scheduled so that the participants received their equipment the same day they received their training. Therefore, they could apply right away what they had learned at the training session.

6. FIELD TRIAL EVALUATION

6.1 Objectives

The objectives of the evaluation were to assess the impact of a voice messaging system on telephonic communications in the office, to assess the performance of Northern Telecom's Meridian SL-1 VOM in an actual office environment, and to develop tools and methodology for the evaluation of voice messaging.

6.2 Methodology

In order to measure the impact of VOM on telephone communications, the evaluation was designed in three phases:

a) Pre-implementation phase

- baseline data were collected before the implementation of the voice messaging system. These were to give us a measurement of telephonic communications in the office without the VOM system and were to allow us to make a comparison with the post-implementation data;

b) Implementation phase

- this phase included the period when the system was installed, the training and also the period when the system was debugged and fine tuned. The information gathered in this phase is important to allow us to properly interpret the final results on use of the system and to gauge user satisfaction;

c) Post-implementation phase

- data were collected while the system was still in operation. These were compared in the final analysis to the data collected during the pre-implementation phase. They give us a measure of change (if any) between the two stages, with and without the system.

The measurement instruments developed for each phase were the following:

a) Pre-implementation phase

Questionnaire: a questionnaire, the Telephone Messaging Survey - Pre-implementation, (see Appendix C) was designed to measure participants' expected use of a VMS and their attitudes towards such a system.

Log: a log (see Appendix D) was designed to measure different aspects of telephonic communications in the office such as:

- number of telephone calls and/or messages/person/day,
- number of calls to/from inside the Department,
- number of calls to/from outside the Department,
- number of calls to/from outside the Government,
- number of calls requiring a dialogue,
- number of calls requiring only a one way communication,
- number of incomplete calls,
- number of messages with content,
- number of messages with name and number only.

Both the questionnaire and the log were to complement one another for the analysis.

b) Implementation phase

- Follow-up on training was conducted and a log and follow-ups of the problems encountered by the users was kept by the trainers/coordinators of the trial.

c) Post-implementation phase

Questionnaire: A questionnaire, the Telephone Messaging Survey - Post-implementation (see Appendix E), was designed to measure participants' subjective usage of VOM and its features and also to measure users' appreciation of VOM and VMS in general.

Log: The same log used in the pre-implementation phase was used in the post-implementation phase. The same aspects of telephonic communications were therefore measured in both phases for comparison purposes.

6.3 Procedures for data collection

Pre-implementation

Starting in December 1986, prior to the installation of the VOM system, field trial participants were introduced to the evaluation's requirements during the presentations made on the field trial.

The instructions for the pre-implementation evaluation were:

a) to fill in the questionnaire right away before leaving the room where the presentation on the field trial had just taken place and users had received general information concerning the system and its implementation;

b) starting the day after the presentation, to record on the log all the telephone calls that they made or received and to record all the respective attributes of those calls. All personal calls made or received were to be recorded under the rubric "outside Government". The logs were to be filled in for five days.

The logs were picked up every day by the evaluators.

Post-implementation

Starting in mid-August 1987, an evaluation package was forwarded to all the participants by internal mail. The covering letter in the package instructed the users to fill in the post-implementation questionnaire and the logs. The instructions for filling in the logs were the same as the ones given during the pre-implementation phase. The completed packages were to be returned to appointed coordinators in the two respective departments.

7. DATA ANALYSIS: RESULTS AND DISCUSSION FOR THE PRE-IMPLEMENTATION PHASE

7.1 Respondents

For the statistical analysis, GTA and TB/Fin were compared and it was concluded that the results were virtually the same for the two departments. Therefore, the data were analysed as belonging to one group of 120 respondents.

7.2 Summary of Results from the Logs

The following Table 7.2 gives a breakdown of the different attributes of telephone calls and messages in the Government.

Table 7.2 - Summary of attributes of telephone calls and messages in the Government

Attributes of calls/messages	
No. of calls/pers./day (placed or received)	9.78
Dialogue required	75%
One-way sufficient	25%
Incomplete calls	32%
Messages:	
Content	17%
Name & No. only	83%
Calls to/from inside Department	63%
Calls to/from outside Department	15%
Calls to/from outside Government	22%

7.3 Number of Calls and Incomplete Calls - Logs

On the average, participants placed or received 9.78 calls per day. Out of these, one third of the calls didn't reach the intended party on the first try and 75% of the total calls required a dialogue.

If these figures are compared with those reported in a study made by AT&T in the late 1970s, where they concluded that 80% of the calls are incomplete but only 45% required a dialogue, we realize that the breakdown for telephonic communications is different in the Government than in the private sector.

Conclusion

Government employees may be conducting more business by phone, so this is why 75% of the total calls require dialogue. Consequently, if more business is conducted by phone, the employees tend to spend more time at their desks. This might be the reason why we record less incomplete calls in the Government than what is reported in the AT&T study.

7.4 Source/Destination of Calls - Logs

The participants recorded 63% of their calls as being to/from the organization - Department. The communication community of interest can therefore be defined as being mostly contained within the Branch or the Department.

Conclusion

While planning for the implementation of a voice messaging system, it should be planned that a whole Branch or Department receives such a system in order to create a critical mass for communication.

7.5 Estimate of Telephone Calls Received Each Day - Questionnaire vs. Logs

The first question on the Telephone Messaging Survey asked participants to estimate the number of calls that they receive every day.

Their estimate was an average of 12.38 calls received per day. According to the actual numbers recorded in the logs they received only 5.43 calls on the average per day.

It is hard to understand that people would overestimate by as much as 100% a prominent activity in their daily working life.

A "Telephone Interruption Log" (see Appendix F) was developed and distributed to a small sample of 10 people chosen at random in GTA. The participants were requested to indicate, for every call they received for five days, what s/he was doing when s/he received a call and if that call was more or less important than the work it interrupted.

The results showed that 53% of the calls received were rated as less important than the work they interrupted.

Conclusion

People are not disturbed as often as they think by the telephone but their work is often disrupted by calls which are judged to be less important than the current work activity.

Most probably, the frustration encountered by being disrupted by less important calls was equated in the participants' mind with being disrupted very often which led them to overestimate the number of calls they received every day.

7.6 Messages - Questionnaire vs. Logs

According to the Survey, participants estimated that 89% of all message slips contain a name and telephone number only. The remaining had content beyond the "call back" information. In the telephone logs, 83% of the messages left were name and telephone number only while 17% had content. In this case, the participants' estimate was relatively accurate.

The participants rated the efficiency of telephone messages on a seven point scale where 1 corresponds to messages not often misplaced, illegible and/or incomplete and where 7 corresponds to messages often misplaced, illegible and/or incomplete. The average score was 2.7 out of 7 meaning that those surveyed seemed to find message slips an adequate method to relay telephone messages (where most of them contain only the name and the telephone number of the caller).

Nota bene: All the data for the ratings are expressed as means and ± standard deviations in parentheses.

7.7 Telephone Tag

Participants gave a high rating (4.95 ± 1.31) to the time wasted with telephone tag. Considering that one third of the phone calls are incomplete on the first try, this reaction was expected.

7.8 Expected Usage of a VMS

Asked to rate the capability to retrieve a voice message at any time, day or night, they were still positive (4.90 ± 1.56) but it seems that there is more enthusiasm generated for the basic capability of the telephone answering machine, judging by the rating (5.34 ± 1.34) they gave to the usage they expected to make of a VMS.

Since some participants had received complaints from people not being able to reach them or leave them a message (in some divisions, the telephone doesn't get answered all the time), they felt that non-participants would have no reluctance to leave a message on the VMS.

Conclusion

Given these positive expectations from the participants, it seemed that VMS responded to a subjective need and that it would be given practical usage and testing throughout the trial.

8. OBSERVATIONS DURING THE IMPLEMENTATION PHASE

During the implementation, we looked into events which could have had an impact on the results.

8.1 Training & Users Support

As for training and users' support, there were no complaints from the users. The system was easy to learn and to use, the support material was comprehensive and the support given by the coordinators was diligent and effective.

8.2 System's Performance

As for the system's performance, there were a few adjustments during the trial as is expected on any new office system being trialed.

These adjustments created very few disruptions for the users except for the following two events:

- at one time, all the messages in the mailboxes were destroyed,
- long distance calls could not come in through the SL-1 until mid-June.

The impact of the first event was minor, except for a few users who lost confidence in the system and consequently disconnected their telephones from the VMS.

The second event had more impact on the usage of the system. Most users who conduct business outside the National Capital Region disconnected their telephones from the VMS until mid-June; some never reconnected their phones to the VMS.

8.3 Impact of User Selection

During the planning of the trial, Directors and their secretaries were included in the user group. After implementation of the VMS, it became rapidly apparent that due to the Directors' position and the availability of the secretaries for back-up answering, it was inappropriate for a machine to answer their phones. Therefore, this group did not make much use of VMS during the trial.

9. DATA ANALYSIS: RESULTS AND DISCUSSION FOR THE POST-IMPLEMENTATION PHASE

9.1 Respondents to the Post-Implementation Questionnaire

There were 83 questionnaires filled in and returned to the evaluators, however, there was an average of 71 $\pm$ 2 responses for any question. Therefore, the data reported herein are based on this average of 71 answers.

9.2 Questionnaire Section 1 - Presentation on the Field Trial

Out of 83 respondents to the post-implementation questionnaire on voice messaging, 71 attended the presentation given by GTA on the Meridian SL-1 field trial.

They rated the quality of the presentation as very good (5.13 $\pm$ .86) and the quantity of information given at the presentation as quite satisfactory (5.0 $\pm$ 1.05).

Interestingly enough, they rated their degree of personal commitment to the field trial as being higher after the presentation (5.51 $\pm$ 1.22) than before the presentation (4.50 $\pm$ 1.80).

Participants' Comments on the Presentation

The comments were very positive in general, stating that the presentation was very informative and very professional.

While the field trial started on a good note, some users felt that throughout the trial users should have been more informed concerning the on-going development of the trial.

Conclusions on the Presentation

With this presentation we achieved one goal which was to have a captive audience to whom we could introduce the evaluation and collect data.

We also achieved our second goal which was to make the participants feel that they were an integral part of the trial. They were quite satisfied with the presentation and their degree of personal commitment was heightened by the presentation.

9.3 Questionnaire Section II - Training

Twelve people got their training from Northern Telecom, 21 from GTA's trainers, 41 from TB's trainers and 9 got no training.

The training received was rated as being very good (5.14 ± 1.23) in general, but those who got the training from Northern Telecom had a tendency to give a lower rating to the quality of their training.

The length of the training was considered just right ($4.27 \pm .79$) and the support received from the trainers was more than satisfactory ($5.62 \pm .94$).

After the training was completed, the majority of the participants were able to use the Meridian SL-1 VOM efficiently with some consultation of the users' manual; only one participant was never able to use VOM efficiently.

Participants' Comments on Training

The training session given by NT followed closely on the installation of the system. The system not yet being finely tuned, the NT trainer encountered difficulties. Consequently the 12 participants who were trained by NT were very dissatisfied with the training. NT's training package was also heavily criticized.

The comments concerning training given by GTA and TB/Fin's trainers was very good. A few participants felt that the training was too fast and that they could have used more hands-on experience.

Conclusions on Training

It looks as if the departmental trainers struck a good balance between quality and length of training. The net results were that the users were relatively independent of the trainers/monitors after the training was completed - which is what good training should achieve.

9.4 Questionnaire Section III - System Usage

9.4.1 On User's Support Material and User Friendliness

The on-line help (4.78 $\pm$ 1.42), the user's manuals (4.90 $\pm$ 1.25) and the summary of commands on the pocket-sized card (4.84 $\pm$ 1.45) were all rated as being useful, but the prompts on the voice messaging system were rated somewhat higher in usefulness (5.08 $\pm$ 1.33). The quality of the recorded voice was rated as quite good (5.46 $\pm$ 1.36). In fact many people reported that the recorded voice was so good that they thought the person was actually answering the phone.

The Meridian SL-1 VOM system was rated as being easy to learn (5.42 ± .98) and easy to use (5.54 ± .90).

Conclusions on Users' Support Material and User Friendliness

It is rare that a system in office automation is well designed, user friendly, and to top it off has well designed users' support material. In this case, the vendor deserves a mention.

9.4.2 On the Usage of VOM's Features

The participants were requested to give a subjective rating as to the frequency of usage they had of each feature on the voice messaging system. The following table contains the means and the standard deviations of the ratings given for each feature.

Table 9.4.2 Means and standard deviations of the subjective usage ratings for each VOM's features

Features	Means	Standard Deviations
Help	2.31	± 1.24
Stop	2.88	± 1.82
Skip Backward	2.73	± 1.51
Play	5.77	± 1.55
Skip Forward	2.58	± 1.70
Previous Message	3.49	± 1.76
Record	3.90	± 1.82
Next Message	4.97	± 1.78
Call Sender	2.64	± 1.85
Reply	1.92	± 1.47
Play Envelope	2.29	± 1.78
Forward	1.97	± 1.41
Reply All	1.42	± .91
Compose	2.89	± 1.74
Delete	6.01	± 1.42
Send	2.39	± 1.72
Logon	3.00	± 2.04
Greeting	4.06	± 1.63
Disconnect	2.38	± 1.95
Go To	1.74	± 1.20

As we can see, the features which were used most often were play, next message, delete, and greeting. These features are the basic ones found on telephone answering machines.

The advantage of a voice messaging system over an answering machine is the communication capability. All the features relating to communication such as compose, send, forward, and reply all were used very little.

Conclusions on the Usage of the VOM Features

Even though there were over one hundred VOM users, they were not necessarily distributed within functional working groups or functional communicating groups. Some participants reflected during the debriefing session after the end of the field trial that most of the people they communicate with were not part of the trial; this factor limited their ability to exhaustively use the VOM system and its features. This may explain why most people tended to use the VOM system as a telephone answering machine rather than using the full capability of this communication tool.

Still we have to contemplate the possibility that office workers, no matter how extended the VMS network might be, may have need primarily for a telephone answering system. This trial did not provide us with enough evidence to draw meaningful conclusions about the ultimate use of the other features.

9.4.3 Participants' Suggestions for New Features and Modifications

Three-quarters of the respondents were satisfied with VOM and felt that it had all of the features they actually need.

The most frequent suggestions for system improvement were:

- The capability to store many different greetings which could be selected rapidly to fit the occasion.

- A shortened introduction to the messages from VOM as in "First message, message 1 'new'. Today at (time) from, etc..." Not only could it be shortened, but it could be accelerated.

One comment was made by only one participant but nevertheless it is worth mentioning since it refers to the bilingual policy in the Government:

- A choice of English or French prompts should be available to the users/owners of the VOM system.

9.4.4 VOM Usefulness in Daily Work and Efficiency

The respondents rated VOM as being quite useful (5.71 ± 1.34) in their daily work. In fact only 6 participants out of 72 respondents thought that a VMS was not that useful and that only people who use the telephone a lot should be given a VMS.

Also respondents felt that they saved time with VOM (5.18 ± 1.48).

Conclusion on Usefulness and Efficiency

Based on participants' subjective responses, it seems that a VMS helps productivity in the office. We will examine this matter further to see if the objective data support such a claim.

9.4.5 Non-Participants' Reaction to Voice Messaging

Over half of the respondents reported that someone had told them that they were bothered by recorded messages to the point of not leaving a message.

To the statement "People don't like to leave messages on Voice-only Messaging", the participants' comments fell evenly in two categories.

There are those who feel that people hate to talk to machines either because they are too busy to learn to deal with a machine or because they feel that machines are too impersonal.

There are, on the other hand, those who feel that the uneasiness towards voice messaging is rapidly overcome once people expect to reach a VMS and once they know enough about the VMS to gain some control over it (i.e. override the personal greeting).

Conclusions on Users' Reactions

Our conclusion is best formulated by a question. Is somebody who is dead set against the use of machines and recorded messages likely to make efficient use of his/her voice messaging system?

9.4.6 Opinions on the Usage of VMS in the Government

Those who gave their opinion on the usage of VMS in the Government agreed emphatically that it is worthwhile for government employees to have access to a voice messaging system.

Their reasons were:

- It cuts down on telephone tag and it saves time for the users.

- The person who leaves a message on a VMS is sure the called party will get the message promptly when s/he is available.

Their reaction was based on the fact that if a VMS is implemented it should be within the whole Branch, or within the whole Department, or in all the departments in the Government.

9.4.7 Comments on VMS in General or VOM by the Participants

A few participants were not favorably disposed to VOM because they had lost their messages once in nine months or because the long distance calls could not come in through the Meridian SL-1 for the first half of the trial.

In spite of these few mishaps, the responses to voice messaging in general and Northern Telecom's Meridian SL-1 VOM in particular are positive and even in some cases enthusiastic judging by the following comment:

"It will be difficult to go back to a pre-VOM way of working."

9.5 Respondents to the Telephone Logs

Logs were distributed to all 120 participants of the field trial. A certain number of participants didn't fill in the logs (e.g. most of the directors and their secretaries who didn't use VOM, individuals who changed positions or moved out of the Department during the trial and finally those who just didn't bother to fill it in).

For comparison of the data between the pre- and the post-implementation phases, only the data of the participants who turned in their logs in both phases of the evaluation were kept for the final analysis. Thus, the final number of participants used for the statistical analysis of the logs was 56.

9.6 Number of Calls; Number of Messages with Content

At the beginning of the trial we expected that since messages could be left by non-participants in the participants' mailbox, the number of messages with content would increase, consequently decreasing telephone tag and therefore decreasing the total number of telephone calls/participant/day.

The data was analysed using a t-test to compare the means of the data collected during the pre-implementation and the post-implementation phases. The total number of messages is not significantly different between the pre- and post-implementation phases; there were not more messages left with the VMS than before the VMS was implemented. The number of messages with content left is significantly higher (by 249%) in the post-implementation phase than in the pre-implementation phase. The number of telephone calls/person/day is only 1.22 calls lower during the post-implementation phase compared to the pre-implementation phase. Of course, this small difference is not statistically significant: it is not a real difference but rather a random occurrence.

The question here is: "Why did the number of messages with content increase significantly but the number of total telephone calls/person/day stay the same?" We would expect that if there are more messages with content there would be less need to place as many telephone calls.

There are at least three hypotheses to account for these unexpected findings.

The first hypothesis is that since the pre-implemention data collection was done during December and January and that the post-implementation data collection was done during August that there was a difference in the business workload because of the time of the year. If this is true, we could deduce that the use of VMS did reduce the number of telephone calls but the workload increased the need for telephone calls and in the end the two balanced out. Thus, this would explain why there is no significant difference in the number of calls/person/day between the pre- and the post-implementation phases.

The second hypothesis is that VMS did decrease the number of business telephone calls but because VMS allows more privacy, participants tended to receive more personal calls at work. If this is true then the increase in personal calls balances out the decrease in business calls and the number of calls/person/day is essentially similar between the pre- the post-implementation phases.

The third hypothesis deals with the fact that there can be only a minimal reduction of the number of calls placed or received per person per day. As we observed with the pre-implementation data, there is an average of 9.78 calls/person/day (see table 7.2). In the field trial, the participants were not chosen on a functional communication network basis. Therefore, the VMS can only have an impact on incoming calls, that is 5.43 calls/person/day (see section 7.5). Thirty-two percent (32%) of all calls were found to be incomplete, which implies that a maximum of (5.43 X 32%) 1.74 calls received/person/day can be captured by the VMS. However, 75% of calls require a dialogue. Therefore, part of the telephone tag can be reduced for 75% of 1.74 calls per person/day and it can be eliminated for 25% of those same calls with the use of VMS.

In order to verify the first two hypotheses, we designed an experiment which is described in detail in Annex A. The results of the experiment follow the same pattern as those of the field trial: a significant increase of messages with content and no significant reduction of the number of calls per person per day. The conclusions are that neither the workload due to the time of year nor the personal calls hypothesis explained why the number of telephone calls did not decrease.

During the user debriefing, we learned that the participants were using the VMS in an innovative way. They replaced numerous handwritten messages or notes to colleagues with audio messages which were tabulated by participants as messages with content.

This phenomenon and the third hypothesis are the most logical explanations for the lack of reduction of telephone calls while the number of messages with content increased significantly.

Conclusion on Number of Calls and Number of Messages with Content

The daily individual number of calls was not reduced by VMS, but had it been reduced, it still would not have had an impact on productivity, considering that it takes 1 minute on the average to place a call.

The number of messages with content increased substantially with the use of VMS. In principle, such an increase has a direct impact on the rate of exchange of information. It reduces delays which are usually incurred with telephone tag while trying to establish synchronous communication. Consequently, business transactions are brought to a conclusion faster, and work becomes more efficient.

10. GENERAL CONCLUSIONS & RECOMMENDATIONS

The objectives of the evaluation were to assess the impact of a voice messaging system on telephonic communications in the office, to assess the performance of Northern Telecom's Meridian SL-1 VOM in an actual office environment, and to develop the methodology and the necessary tools to conduct an office automation field trial evaluation.

Prior to the trial, positive expectations from the participants were expressed regarding the expected usage of a VMS. It seemed that VMS responded to a subjective need and that it would be given practical usage and testing throughout the trial.

The participants were quite satisfied with the presentation given before the start of the trial and their degree of personal commitment was heightened by this overview of the system and the field trial.

The trainers struck a good balance between quality and length of training. The net results were that the users were relatively independent of the trainers/monitors after the training was completed - which is what good training should achieve.

It is rare that a system in office automation is well designed, user friendly and to top it off has well designed users' support material. It was the case in this trial, and for this the vendor deserves a mention. The performance of Northern Telecom's Meridian SL-1 VOM was considered very good for a non-commercialized system and was very effective for voice messaging.

It was found that Government employees are conducting more business by phone than private sector employees and 75% of the total calls require dialogue. Even though there were over a hundred VOM users, they were

not necessarily distributed within functional working groups or functional communicating groups. Some participants reflected during the debriefing session after the end of the field trial that most of the people they communicate with were not part of the trial. This may explain why most people tended to use the VOM system as a telephone answering machine rather than using the full capability of this communication tool. Still we have to contemplate the possibility that office workers, no matter how extended the VMS network might be, may have need primarily for a telephone answering system. This trial did not provide us with enough evidence to draw meaningful conclusions about the ultimate use of the other features. It was also observed that 63% of telephonic communications are done within the Department. Therefore, while planning for the implementation of a voice messaging system, it should be planned that a whole Branch or Department receives such a system in order to create a critical mass for communication.

Based on participants' subjective responses, it seems that a VMS helps productivity in the office and would be a great asset for office workers in the Federal Government.

Based on objective data, it was found that the number of messages with content increased significantly but the number of calls/person/day remained unchanged. It is considered that the number of messages with content is a better indicator of real productivity than the number of calls. The former encompasses the whole aspect of accelerating exchanges of information and completion of business transactions; the latter involves only the concept of time required to actually place a call.

The methodology selected and the tools developed for the evaluation of this field trial were appropriate, given that no study containing full methodology and evaluation tools purporting to a voice messaging system had ever been published. The results show that the number of calls per person per day is not an adequate indicator of productivity. But since it was the easiest data to collect requiring less time from the participants, this variable had to be measured in a first study to ensure its validity or non-validity as a productivity index. By eliminating this variable as an index of productivity it is clear that the most appropriate variable to measure the impact of a VMS on productivity is the concept of delays involved in verbal business transactions. We are conscious that this is a time consuming activity, but necessary in order to measure the full impact of a VMS on office work.

We strongly recommend that anyone involved in the study of the impact of a VMS on office work measure not the number of calls, but rather the delays involved in relaying the verbal information necessary in order to execute one's work. Therefore the impact of a VMS should look at the level of procedural tasks instead of counting the number of telephone calls.

Annex A

1.0 Experimental Design - Testing of New Hypotheses

To verify the two hypotheses mentionned in Section 9.6, we designed a completely randomized factorial experiment where the impact of VMS was measured by comparing a group with VMS to a group without VMS and the effect of personal calls was measured by comparing a group which recorded personal calls to a control group which did not record personal calls.

To control for the effect of the time of the year on the workload, we requested that all 40 participants in the experiment fill in the logs for 5 days during the same working week in September.

Forty people were selected at random in GTA: twenty people with access to the VMS and twenty people without a VMS. The 20 persons with access to the VMS were redistributed into 2 groups; one group of 10 people was asked to record their personal calls on the log under the item outside government; the other group of 10 people was to omit altogether their personal calls from the log. The 20 people without access to VMS were also distributed equally at random to 2 groups: with and without personal calls.

The experimental design looked like this:

	+P.C.	- P.C.
+ VMS	10 pers	10 pers
- VMS	10 pers	10 pers

Total = 20 pers. + 20 pers. = 40 pers.

where + VMS refers to the group with access to the voice messaging system;
- VMS refers to the group without access to the voice messaging system;
+ P.C. refers to the group who recorded their personal calls
- P.C. refers to the group who did not record their personal calls.

2.0 Statistical Analysis of the Data on the Experiment

The data was analysed using an analysis of variance factorial (2 X 2). The comparison of the group with VMS versus the group without VMS revealed no significant different for the number of calls/person/day. But the comparison of the VMS group to the group without VMS revealed a significant difference ($F = 7.19$, p .01) for the number of messages left with content. Therefore, we reproduced, with this circumscribed experiment, the same effect as in the major data collection done for the trial. The VMS does not decrease the number of calls per day while it allows an increase of messages with content.

The effect of personal calls versus no personal calls was not statistically significant and the interaction between VMS and personal calls was also not statistically significant while being compared either for the number of calls and number of messages with content. Therefore, even if the participants had a greater sense of privacy with the use of VMS, it did not have any influence on the number of personal calls placed or received at work every day.

3.0 Conclusion

It was found that neither the workload due to the time of the year nor the personal calls hypotheses explained why the the number of telephone calls didn't decrease while the number of messages with content increased with VMS. The only thing we know is that with a voice messaging system there are more messages left with content.

APPENDIX A
FIELD TRIAL MILESTONES

SL-1/PTE Installation	End of September 1986
Training given by NT	17 December 1986
User Presentation - GTA	8-10 December 1986
- TB/Fin	January to mid-February 1987
Initial Users	17 December 1986
X.25 Access	9 January 1987 - 4 September 1987
Final Problem with Integration between DMS and SL-1	Mid-June 1987
Trial ending	18 September 1987
Equipment Removed	1 October 1987

APPENDIX B
LIST OF VOM'S FEATURES

VOICE MESSAGING COMMANDS

*	Help
#	Stop
1	Skip Backward
2	Play
3	Skip Forward
4	Previous Message
5	Record
6	Next Message
9	Call Sender
71	Reply
72	Play Envelope
73	Forward
74	Reply All
75	Compose
76	Delete
79	Send
81	Log On
82	Greeting
83	Disconnect
86	Go To

APPENDIX C

A copy of the Pre-implementation Telephone Messaging Survey

INTEGRATED OFFICE SYSTEM TRIAL:

Telephone Messaging Survey

This questionnaire has been developed by:

Maria M. Morin, Ph.D.
Lucie Côté, M.Ps.
Division of Development & Engineering
Government Telecommunications Agency
Department of Communications
Ottawa, Ontario
October 10, 1986

INTEGRATED OFFICE SYSTEM TRIAL:

Telephone Messaging Survey

This survey is part of the evaluation process of the integrated office system that you will be receiving shortly.

We would like to compare each individual's attitudes and expectancies before and after the implementation of the system. You will therefore receive a similar survey after the implementation period.

We would ask you to write your name on this sheet, to detach it and return it separately from the survey. Your confidentiality will therefore be ensured, while allowing us to compare answers on an individual basis.

Your responses will be used by the Division of Development and Engineering in the Government Telecommunications Agency to evaluate the results of the integrated office system trial service in your department. All data made public will be averaged across many individuals in order to guarantee the anonymity of the participants.

Thank you for your co-operation.

NAME:

DEPARTMENT:

TELEPHONE MESSAGING SURVEY

Instructions:

Read the question carefully. To rate a given question please circle the number that best describes it. For example:

Do you often use a hand calculator?

	1	2	3	4	5	6	7	
Not at all								Very often

A response of 4 on the frequency scale indicates that you have an average use for a hand calculator. Please use the extremes of the scales (i.e. 1 and 7) only if you think that it truly reflects your evaluation of this aspect.

Work rapidly through the questionnaire, without pausing more than a few seconds on each question and without returning to ones you have already completed.

1. On average, how many telephone calls do you receive each day?

_____

2. How frequently are written telephone messages misplaced, illegible, and/or incomplete?

1 2 3 4 5 6 7

Not often — Very often

3. Do you feel that you waste time returning telephone calls and leaving messages (telephone tag) because people you are trying to reach are unavailable?

1 2 3 4 5 6 7

No time wasted — A lot of time wasted

4. How much use would you make of a feature which would enable you to leave a voice message with the person you are calling, when s/he is away from his/her desk?

1 2 3 4 5 6 7

Very little — Very much

5. How much would you use a feature allowing you to retrieve voice messages any time, day or night?

1 2 3 4 5 6 7

Very little — Very much

6. During an average day, what proportion of your incoming calls are from:

Within your department: _____ %
From outside your department, but within the government: _____ %
From outside the government: _____ %

7. When people are unable to reach you, do they leave a message to call back or leave a message with a content? State approximate percentage in each case.

_____ % message to call back
_____ % message with a content

8. Do you feel that people trying to reach you by phone would make use of the voice messaging capability?

1 2 3 4 5 6 7

Very little Very much

9. What percentage of people trying to reach you do you feel would leave a message to call back or a message with a content using the voice messaging facility?

_____ % message to call back
_____ % message with a content

10. Do you receive complaints from people who find it difficult to reach you by phone?

1 2 3 4 5 6 7

Never Very often

11. List 3 persons in your department with whom you exchange many telephone calls each week and with whom you would like to leave voice messages.

Name	Division

APPENDIX D

A copy of the Daily Telephone Message Log used to collect data during the pre- and the post-implementation phases.

MMX71001

Government of Canada
Department of Communications

Gouvernement du Canada
Ministère des Communications

IDENTIFIER
CODE D'IDENTIFICATION ▶

DATE ▶

DAILY TELEPHONE MESSAGE LOG

RELEVÉ DES APPELS OU MESSAGES TÉLÉPHONIQUES

	DESCRIPTION		CALL NUMBER / NUMÉRO DE L'APPEL																			
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
PARTY INVOLVED / CORRESPONDANT	1. WITHIN DEPARTMENT / À L'INTÉRIEUR DU MINISTÈRE																					
	2. OUTSIDE DEPARTMENT / À L'EXTÉRIEUR DU MINISTÈRE																					
	3. OUTSIDE GOVERNMENT / À L'EXTÉRIEUR DU RÉSEAU DE L'ÉTAT																					
	4. LONG DISTANCE / APPEL INTERURBAIN																					
	5. CONFERENCE CALL / TÉLÉCONFÉRENCE																					
	6. IN REPLY TO MESSAGE / EN RÉPONSE À UN MESSAGE																					
	7. RETURN CALL REQUIRED / RAPPEL NÉCESSAIRE																					
	8. NO FURTHER ACTION REQUIRED / AUCUN SUIVI NÉCESSAIRE																					
INCOMING CALLS / APPELS REÇUS	9. CALL TAKEN BY YOU / PAR VOUS-MÊME																					
	10. TRANSFERRED TO ANOTHER PARTY / ACHEMINÉ À UN AUTRE POSTE																					
	11. WRONG NUMBER / MAUVAIS NUMÉRO																					
	12. TRANSFERRED FROM ANOTHER PARTY / TRANSFÉRÉ D'UN AUTRE POSTE																					
OUTGOING CALLS / APPELS PLACÉS	13. FULL NUMBER DIALED / NUMÉRO COMPOSÉ AU COMPLET																					
	14. INTERCOM NUMBER DIALED / PAR INTERCOM																					
	15. SPEED CALL NUMBER DIALED / NUMÉRO ABRÉGÉ																					
	16. PROGRAM DIALED / COMPOSÉ AUTOMATIQUEMENT																					
	SOURCE OF TELEPHONE NUMBER / ORIGINE DU NUMÉRO	17. MEMORY / DE MÉMOIRE																				
		18. TELEPHONE DIRECTORY / ANNUAIRE TÉLÉPHONIQUE																				
		19. PERSONAL DIRECTORY / ANNUAIRE PERSONNEL																				
		20. AUTOMATED DIRECTORY / ANNUAIRE ÉLECTRONIQUE																				
		21. MESSAGE SLIP / D'UN MESSAGE																				
	22. NO ANSWER / PAS DE RÉPONSE																					
	23. LINE BUSY / OCCUPÉ																					
	24. WRONG NUMBER / MAUVAIS NUMÉRO																					
	25. LEFT MESSAGE / MESSAGE LAISSÉ																					
TYPE OF CALL / GENRE D'APPEL	26. ONE WAY SUFFICIENT / COMMUNICATION À SENS UNIQUE																					
	27. DIALOGUE REQUIRED / COMMUNICATION RÉCIPROQUE																					
CALL DURATION AND TIME / DURÉE ET HEURE DE L'APPEL	28. LESS THAN 2 MINUTES / MOINS DE DEUX MINUTES																					
	29. MORE THAN 2 MINUTES / PLUS DE DEUX MINUTES																					
	30. TIME OF CALL (HOUR ONLY) / HEURE DE L'APPEL (INDIQUER L'HEURE SEULEMENT)																					
MESSAGES	TAKEN BY / TRANSMIS PAR	31. SECRETARY / SECRÉTAIRE																				
		32. COLLEAGUE / COLLÈGUE																				
		33. VOICE MESSAGING / AUDIO-MESSAGERIE																				
	CONTENT / CONTENU	34. NAME AND NUMBER / NOM ET NUMÉRO																				
		35. NAME, NO. AND MESSAGE / NOM, Nº ET MESSAGE																				
		36. WRONG NAME OR NO. / INCOMPLET/INCORRECT																				
	MESSAGE RECEIVED / MESSAGE REÇU	37. WITHIN 30 MINUTES / EN MOINS DE 30 MIN.																				
		38. WITHIN 2 HOURS / EN MOINS DE 2 HEURES																				
		39. BEYOND 2 HOURS / APRÈS 2 HEURES ET PLUS																				

APPENDIX E

A copy of the Post-implementation Voice Messaging Survey.

INTEGRATED OFFICE SYSTEM TRIAL:

Voice Messaging Survey

Post-implementation

This questionnaire was developed by:

Maria M. Morin, Ph.D.
Lucie Côté, M.Ps.
Division of Development & Engineering
Government Telecommunications Agency
Department of Communications
Ottawa, Ontario

July 14, 1987

INTEGRATED OFFICE SYSTEM TRIAL:

Voice Messaging Survey

Post Implementation

This survey is part of the evaluation process of the integrated office system and deals specifically with the voice messaging feature of the system.

We would ask you to write your name on this sheet, to detach it and return it separately from the survey. Your confidentiality will therefore be ensured, while allowing us to compare answers on an individual basis.

Your responses will be used by the Division of Development and Engineering in the Government Telecommunications Agency to evaluate the results of the integrated office system trial service in your department. All data made public will be averaged across all individuals in order to guarantee the anonymity of the participants.

Thank you for your co-operation.

NAME:

DEPARTMENT:

What type of terminal or phone do you have?

—— M4020

—— Unity II

VOICE MESSAGING SURVEY

Instructions:

Read the question carefully. To rate a given question please circle the number that best describes it. For example:

Do you often use a hand calculator?

	1	2	3	(4)	5	6	7	
Not at all								Very often

A response of 4 on the frequency scale indicates that you have an average use for a hand calculator. Please use the extremes of the scales (i.e. 1 and 7) only if you think that it truly reflects your evaluation of this aspect.

Work rapidly through the questionnaire, without pausing more than a few seconds on each question and without returning to ones you have already completed.

SECTION 1 - PRESENTATION ON THE FIELD TRIAL

A formal presentation was given by a GTA staff member before the implementation of the Meridian SL-1.

1. Did you attend that presentation on the Meridian SL-1 field trial?

___ Yes ___ No **(If the answer is no, go to Section II)**

2. How would you rate the quality of that presentation?

poor 1 2 3 4 5 6 7 excellent

3. How would you rate the quantity of information you got at that presentation?

very little information 1 2 3 4 5 6 7 a lot of information

4. How would you rate the degree of your personal commmitment in using an integrated office system or a voice messaging system?

Before the presentation

no personal commitment 1 2 3 4 5 6 7 high personal commitment

After the presentation

no personal commitment 1 2 3 4 5 6 7 high personal commitment

5. Do you have any comments regarding the presentation of the Field Trial?

SECTION II - TRAINING

Formal training was given on the Meridian SL-1 either by Northern Telecom or by departmental trainers/coordinators.

6. Did you receive formal training on the Meridian SL-1?

____ Yes ____ No **(If the answer is no, go to Section III).**

7. Who gave you your training on the Meridian SL-1?

___ Northern Telecom
___ GTA trainers/coordinators
___ Fin/TB trainers/coordinators

8. How would you rate the training you received?

poor 1 2 3 4 5 6 7 excellent

9. How would you rate the length of the training you received?

too short 1 2 3 4 5 6 7 too long

10. How would you rate the support you got from trainers/coordinators?

poor 1 2 3 4 5 6 7 excellent

11. Which of the following statements would best fit your experience <u>after you completed the training</u> (if necessary, check more than one statement):

___ I was able to use the Meridian SL-1 efficiently without further help from the trainers/coordinators and the user's manuals.

___ I was able to use the Meridian SL-1 efficiently by consulting the user's manuals.

___ I was able to use the Meridian SL-1 efficiently after calling the trainers/coordinators once or twice.

___ I was able to use the Meridian SL-1 efficiently after calling the trainers/coordinators three times or more.

___ I was never able to use the Meridian SL-1 efficiently .

12. Do you have any comments regarding the training received on Voice-only Messaging?

SECTION III - SYSTEM USAGE

All the participants in the Meridian SL-1 trial had access to Voice-only Messaging. The following questions will specifically cover this feature.

13. When did you obtain access to the Voice-only Messaging on the Meridian SL-1? (Indicate the month)

14. Have you used the Voice-only Messaging on a regular basis after obtaining access to the Meridian SL-1?

___ Yes ___ No

15. If you haven't used the Voice-only Messaging on a regular basis, please state the reason(s).

16. Do you feel you have used Voice-only Messaging sufficiently to be able to answer questions about it?

___ Yes ___ No **(If the answer is no, you may stop filling in the questionnaire.)**

17. How would you rate the usefulness of the following:

Prompts on Voice-only Messaging

not useful 1 2 3 4 5 6 7 very useful

On-line help on Voice-only Messaging

not useful 1 2 3 4 5 6 7 very useful

User's manuals

not useful 1 2 3 4 5 6 7 very useful

Summary of the Voice-only Messaging commands on the pocket-size card

not useful 1 2 3 4 5 6 7 very useful

18. How would you rate the user friendliness of Voice-only Messaging?

Learning Voice-only Messaging

very difficult 1 2 3 4 5 6 7 very easy

Using Voice-only Messaging

very difficult 1 2 3 4 5 6 7 very easy

19. How would you rate the quality of the voice in the recorded messages left in your voice mailbox?

	1	2	3	4	5	6	7	
poor								excellent

20. How often did you use the following commands on Voice-only Messaging? (The command keys are in parentheses)

Help (*)

	1	2	3	4	5	6	7	
very rarely								very often

Stop (#)

	1	2	3	4	5	6	7	
very rarely								very often

Skip backward (1)

	1	2	3	4	5	6	7	
very rarely								very often

Play (2)

	1	2	3	4	5	6	7	
very rarely								very often

Skip Forward (3)

very rarely — 1 2 3 4 5 6 7 — very often

Previous message (4)

very rarely — 1 2 3 4 5 6 7 — very often

Record (5)

very rarely — 1 2 3 4 5 6 7 — very often

Next Message (6)

very rarely — 1 2 3 4 5 6 7 — very often

Call sender (9)

very rarely — 1 2 3 4 5 6 7 — very often

Reply (71)

very rarely — 1 2 3 4 5 6 7 — very often

Play envelope (72)

very rarely — 1 2 3 4 5 6 7 — very often

Forward (73)

very rarely — 1 2 3 4 5 6 7 — very often

Reply all (74)

very rarely — 1 2 3 4 5 6 7 — very often

Compose (75)

very rarely — 1 2 3 4 5 6 7 — very often

Delete (76)

very rarely — 1 2 3 4 5 6 7 — very often

Send (79)

very rarely — 1 2 3 4 5 6 7 — very often

Logon (81)

very rarely 1 2 3 4 5 6 7 very often

Change greeting or record personal greeting (82)

very rarely 1 2 3 4 5 6 7 very often

Disconnect (83)

very rarely 1 2 3 4 5 6 7 very often

Go to a specific message number (86)

very rarely 1 2 3 4 5 6 7 very often

21. Does the Meridian SL-1 offer you all the features or commands you need on a Voice-only messaging system?

___ Yes ___ No

22. If no, which features would you like to see added? Specify.

23. Which modifications would you suggest be brought to the Meridian SL-1?

24. How would you rate the usefulness of Voice-only Messaging in your daily work?

not very useful 1 2 3 4 5 6 7 very useful

25. How would you rate the time saved by using Voice-only Messaging?

no time saved 1 2 3 4 5 6 7 a lot of time saved

26. How often did callers hang up after hearing all of your greeting message?

1 2 3 4 5 6 7

never very often

27. Has anybody told you that your Voice-only messaging system bothered them to the point of not leaving a message?

___ Yes ___ No

28. Do you agree with the following statement "People don't like to leave messages on Voice-only messaging".

___ Yes Explain:

___ No

___ Somewhat. Explain:

29. When people are leaving a message on your Voice-only Messaging system, what percentage leave

only their name & telephone no. _____ %

a message with content _____ %

30. In your opinion is it worthwhile for government employees to have access to Voice-only messaging? Explain.

31. Do you have any comments on voice messaging systems in general or on the Meridian SL-1 Voice-only Messaging system specifically?

APPENDIX F

A copy of the Telephone Interruption Log.

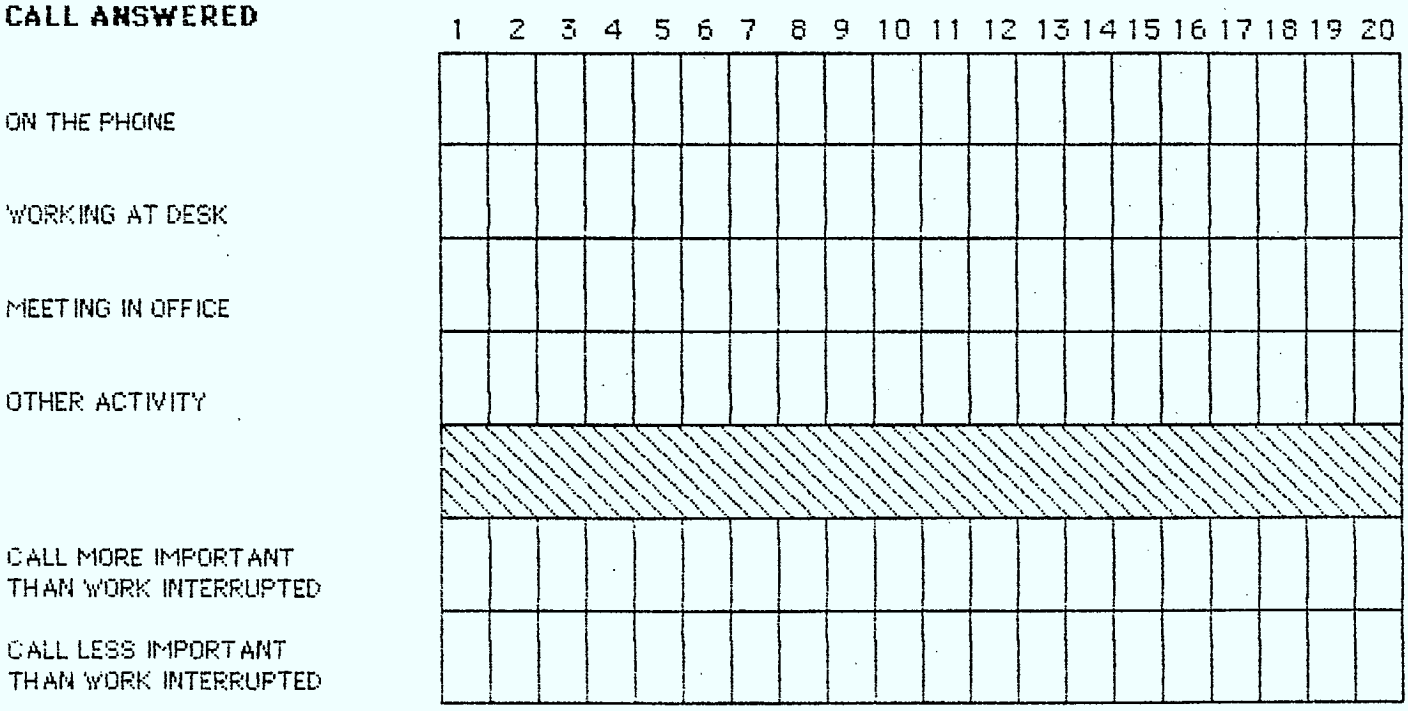
TELEPHONE INTERRUPTIONS

PLEASE TICK THE APPROPRIATE BOXES FOR THE CALLS YOU RECEIVE.

IF YOU NEED MORE FORMS OR HAVE ANY QUESTIONS, PLEASE CONTACT DENYSE BOULET (990-2257)

DATE: _____

ACTIVITY WHEN CALL ANSWERED



MORIN, M.M.
--Meridian SL-1 voice-only messaging : results of an evaluation of a pilote trial