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Insights on the Implementation of a Computer-based Message System

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Although computer-based message systems (CBMS) have been adopted in parts of many corporations, they are still a new form of communications to many others. This paper is addressed to management and planners who may be contemplating the introduction of a CBMS into their organization. Its purpose is to present insights we gained from a case study of such an implementation in a medium-sized, multi-national firm which decided to introduce a CBMS on a company-wide basis. We present results on usage patterns, including traffic volumes, and on what motivated staff and management to adopt the use of the system, the way they used it and the effects it had on their work and their interactions with others. The paper concludes with a set of suggested implementation guidelines which flow from our experience.

Keywords: Computer-based message systems, electronic mail, effectiveness, human factors, message traffic..

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1. Introduction

Electronic aids to communication have become a major part of commercial offerings in the field of office automation and computer-based message services (CBMS) are one of the most popular forms. CBMS are available in two major types: they may form a part of a host computer system that is used within the organization for other purposes, such as data processing or office automation, or they may be offered by public service companies as a communications service. This paper deals with both types.

Although CBMS have been adopted in parts of many corporations, they are still a new form of communications to many others and remain the exception rather than the norm as a primary means of inter- or intra-corporate communication. Like all modes of human communication, they have unique characteristics which make them more suitable for certain types of use than others and they

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have effects on the way people work that may not always be obvious in advance.

A management which contemplates introducing such a service is presented with the challenge of anticipating its effects, benefits and costs and of deciding on a strategy for introduction. This is particularly so because it is difficult to conduct a trial of CBMS on a limited basis since, as we have seen in this study, it will only realise its potential value when almost all members of an organization use it as a normal mode of communication.

The purpose of this paper is to assist management and planners in coping with this problem by presenting insights gained from our experience with a case study [1] of a firm which decided to introduce CBMS on a company-wide basis. First, we describe the firm, the reasons why management decided to take this initiative, the basic approach they took and the CBMS which were used. Next, we describe the method by which we gathered our results and then we present two sets of results:

- usage patterns, which illustrate the habits of users in accessing the system and sending messages, and include typical traffic volumes, and
- some of the insights and understanding we gained of what motivated people to use the CBMS, the way they used it and the effect it had on their work and their interactions with others.

We conclude with a set of guidelines which flow from our experience and which we believe will be of value in deciding on and planning other implementations.

2. Characteristics of the Firm

The study was carried out at the corporate headquarters of a medium-sized, multi-national, high-technology firm operating in a fiercely competitive international market.

The firm maintains a world-wide sales and service force, with some forty branch offices, and has production facilities in several other countries. This is a task-oriented firm where job-title means little. The structure is quite flat, with much decision-making pushed down to the middle management level and corporate policy-making is largely accomplished by consensus.

The firm employed roughly 2000 white collar employees in its head office, at the time of our study, and it was these employees who formed the study group. The study group included a large number of computer and engineering personnel engaged in research and development. It also included marketing staff and the human-resource and administrative staff comprising professional, management and support levels, who generally did not have any formal training in technology.

3. CBMS Services and the Implementation Strategy

Two text-oriented CBMS were in use within the organization at the time of the study. The one with the smaller user community, which we shall refer to as System B, had been introduced without conscious decision making, on the part of management, since it was an integral feature of the computer system used for the design and development work of the organization. Its scope was strictly limited to a group of computer professionals and their middle management, from a single department, at a single geographical location.

About two years prior to our study, management had made a decision to introduce a second, company-wide CBMS, which we shall call System A. This decision was reached in response to a perceived need for more timely and efficient communications within the organization. Because of the growth and inter-continental distribution of the company, the decision-making style and the rapidly changing state of the external environment, it was considered vitally important to have an effective medium for the exchange of timely information. The telephone was perceived to be inadequate because of the effect of time zones and the number of staff in travel status at any given time.

At the time of our study, System A had been in widespread use within the firm for some two years and System B for somewhat longer. Consequently, initial transient effects had subsided and we were able to assess relatively stable usage patterns. At the same time, the systems had not been in use for so long that people had forgotten how they operated before they were introduced.

System A is the more interesting, from the point of view of this paper, for several reasons:

- it was introduced as the result of a deliberate decision, and in response to a specific need;
- by the time of the study it had become a major, and normal, means of communication throughout the firm and was in use by about 1500 staff in all geographical locations and at all levels;
- its user group is more typical of other organizations.

We present results for the user groups of both systems, however, because it proves interesting to see the similarities and differences between the way the two groups used their systems.

In deciding to introduce System A, management made a decision to use a CBMS which was available as a commercial, public service. It felt that this would promote the rapid expansion of the CBMS throughout the company for three reasons:

1. It would provide ready international access.
2. It would minimize the capital cost of introducing the service.
3. The one chosen based its charges on the volume of messages delivered rather than on the number of individual accounts authorised.

System A was accessible from any point in the world, served by interconnected packet-switched networks, and so was available to users while travelling. As a result of chosing a public service, the only capital cost involved was the cost of acquiring terminals, for those who did not already have them, and the cost of interfaces to a public, packet-switched network at the major sites. Because of the third reason, there was no temptation for a manager to attempt to minimise costs by asking people to share an account among a group or small department. In this way, management minimised the barriers to access to the system.

Since System A was the primary CBMS, used by personnel in all geographical locations and at all levels, its group of users was disparate in both geographical and professional respects and there were many, naturally occurring, communicating communities of common interest within the larger group. Users of System B, on the other hand, made heavy use of its host computer for other aspects of their work. This user group was close-knit and cohesive, both geographically and professionally, with a high degree of commonality of interests between members.

About 60% of the people included in our study had a terminal for their exclusive use while about 30% shared a terminal located within their immediate work area. The other 10% did not have accounts. Printers were usually shared between a group of ten or more people. Virtually everyone had a telephone for his or her exclusive use.

4. Methodology of the Study

In conducting our study, we used four different sources of information: direct observation of activity on the site; semi-structured interviews; a specially designed, multiple-choice, questionnaire and statistics which were generated as part of the normal operation of System A. Consequently, the results we present are based primarily on the perceptions of users as represented by interview and questionnaire responses. In the case of usage pattern results, we were able to cross-check some user reported values, such as numbers of messages sent and number of access times per day, against the System A statistics. In these cases we achieved a good degree of agreement.

We conducted a series of semi-structured interviews with eighteen of the study site personnel, selected to represented a cross-section of the organization in terms of function and level and also in terms of both heavy and light users of the CBMS. Each interview explored a pre-defined set of issues but participants were also encouraged to raise and discussed whatever other issues they wished in order to generate greater insight into user views and attitudes than was possible with the questionnaire.

Following a pre-test of the questionnaire, and appropriate modifications, we distributed it to a large segment of the head-office population, including both users and non-users of the CBMS. We obtained an encouraging response rate of 30%, for a total of 419 respondents thus ensuring a good degree of coverage of the population. Of these 419 respondents, 106 had access to System A only, 119 had access to System B only while an additional 161 had access to both System A and System B.

5. Results

5.1. Usage Patterns

This section presents the results of our investigation of the habits of users in acessing the CBMS and sending messages.

The first section of Table 1 shows that, for the user group of System A, the norm was to access the system once (36% of respondents) or twice (44% of respondents) per day. For the user group of system B, the norm was to access the CBMS hourly (35% of respondents) or twice per day (25% of respondents). The difference is accounted for by the fact that it is necessary for users of System A to log on specifically for the purpose of using the CBMS. On the other hand, users of System B spend much of their working day using terminals logged on to its host and are alerted when mail arrives.

The next two rows of Table 1 show that, for each system, 11% of users generated 50% of the traffic (total messages) while 33% generated 80%. It is interesting to see identical results for the two groups and even more interesting to compare these results with those of Nicholson [3], who studied the sites of two different firms using an in-house CBMS running on an office automation system. He found that 12% of users generated 50% of the traffic, while 35–36% generated 80%, a very close correspondence.

Next, Table 1 shows that the typical size of a user's community of correspondents was 15–30 people for each System. Based on our questionnaires and interviews, this group typically includes subordinates, superiors and peers within both the users own organizational unit and other units indicating a communication pattern which does not strongly conform to organizational lines.

The first two rows of Table 2 show how users were distributed according to the number of messages sent per week. For each of the two systems, there is a rather large proportion of very light users, sending an average of just over two messages per week. The bulk of users send between 6 and 30 messages per week. These active users constitute 31% of the user group in the case of System A and 40% for System B. The remainder represents a small percentage of heavy users.

The mean number of messages sent and received per week is shown in the remainder of Table 2. Despite the very different geographical distributions and professional responsibilities of the two systems and their user groups, the differences in these values are quite modest. The mean number of messages sent for all users, 9 and 12 per week, are also quite close to the values of 9.5 and 9 observed by Nicholson [3] in the two systems he studied (based on his figures of 1.9 and 1.8 per day). In fact, all our figures on usage patterns compare so closely to Nicholson's that one is tempted to feel that they may be a general indicator of user habits.

From the two tables, it can be seen that there is

Table 1
Usage Patterns.

	System A	System B
Frequency of access		
% of users accessing system:		
Hourly	5.0	34.7
Twice daily	43.6	25.0
Daily	35.7	16.7
Twice weekly	11.7	9.3
Occasionally	4.0	14.3
% of users generating:		
50% of traffic	11	11
80% of traffic	33	33
Typical number of people in a users corresponding community.	15–30	15–30

Table 2
Message volume distributions.

	Light Users	Medium Users	Heavy Users	All Users
Range of messages sent per week	0–5	6–30	> 31	
System A users-%	65	31	4	100
System B users-%	54	40	7	100
Mean number of messages sent per week				
System A	2	16	65	9
System B	2	15	71	12
Mean number of messages received per week				
System A	10	25	100	19
System B	10	26	101	23

a significant number of people who send few messages. It is important to notice, however, that this group nevertheless needs to be on the system since the last two rows of Table 2 show that they estimated that they were receiving about 10 messages a week. This is partly due to the fact that people in administrative or management positions were sending information messages, and requests for actions, to distribution lists. If these light users were not on the system, an alternative method would have to be found to send them messages, distribution lists would be incomplete and the effectiveness and value of the system as a whole would be reduced. This result, together with the non-hierarchical communication pattern, referred to above, supports our earlier suggestion that a CBMS does not realise its full benefits until almost all members of an organization are connected.

We found, as did Nicholson [3], that there were no significant differences in the usage volumes by organizational level of the user so that usage patterns are determined more by individual habits than organizational level. Another study, by Smith and Benjamin [4], reported higher volumes of messages overall, and particularly for administrative/clerical workers. However, they studied a system in which highly structured and routine messages, such as order entries, were supported, which was not the case in the systems studied by ourselves or Nicholson.

Although we did not collect data directly on the typical length of a message, it was evident from interviews that long, verbose messages were not welcomed. Terse messages of a few lines were the norm.

5.2 Reasons for Using a CBMS.

In general, people are not obliged to use a CBMS, even when one is available to them. In this section we discuss the reasons most frequently quoted by our respondents for using the CBMS.

The major reasons were:

- the difficulty of reaching people by telephone;
- the lengthy time delays involved in paper-based communications;
- a reduction in the number of interruptions to work.

The first reason refers to the well-known "telephone-tag" phenomenon. This is particularly important when time-zones or work shifts cause barriers to communication or when people are in travel status. Timeliness is also improved by a reduction in delays inherent in paper-based communications, normally incurred in dictation, typing, proofreading, correction, distribution and filing.

Reduction in the number of interruptions to their own and others' work, which previously resulted from colleagues dropping by or telephoning was an important factor for System B users, who communicated with each other frequently over the course of a day. For the more diverse and geographically distributed users of System A this was not such an important factor although it was still significant.

One of our interviewees gave, as a reason for not making use of the CBMS, the fact that the majority of his subordinates were not on the system. This reason is significant since, in the authors' experience, there is quite frequently a tendency to carry out field trials of messaging systems for high-level management or executive groups before the system is made available to lower levels of the organization.

5.3 Impact on Other Modes of Communication

A point of some interest to us was the impact that the CBMS had on other modes of communication. The main points that emerged were that:

- the CBMS was preferred over memoranda, which were little used in the organization;
- the presence of the CBMS had reduced the number of telephone calls and face-to-face encounters that were solely for the purpose of conveying information in one direction (Birks [5] found a similar result);
- lengthier face-to-face meetings and telephone calls had been supplemented and enhanced by use of the CBMS;
- some additional travel was occurring as a result of CBMS use, a result we had not anticipated.

The CBMS was frequently used to convey information, questions, comments or meeting agendas which would be discussed further in subsequent telephone calls or in face-to-face meetings. Thus both face-to-face meetings and telephone conversations were perceived to be more productive than previously.

Upper-level personnel indicated that some ad-

ditional travel occurred as a result of CBMS use. Exposure to events and activities in other locations frequently led to participation in them, eventually requiring face-to-face interaction and therefore travel.

5.4 Benefits of Using the CBMS

Users indicated the following benefits of their use of the CBMS:

1. The message tracking capability of a CBMS (System A) made a very significant contribution to saving time in communications activities.
2. Many ideas were recorded and circulated that would otherwise have been lost.
3. Opinions and decisions were better considered than before.
4. Increased information flow between organizational levels and between departments was occurring.
5. There was a reduction in "conversation overhead."
6. They had increased their volume of communications without spending more time.

In addition, they commented that the potential disadvantage of unwanted messages, did not present a serious problem.

A very high value was attached by our interviewees to the message-tracking capability of System A. Once a message is sent, its status is tracked automatically by the system so that the sender can determine whether and when it was read by the recipient. Thus, if a message has been read but not replied to, the sender can decide whether to follow-up immediately, or to allow further time for reply or, indeed, to assume that the recipient does not wish to pursue the matter. In any of these cases the sender is in a much better position to decide on subsequent actions than if he is unaware of whether the message has been read. Users felt strongly that this contributed greatly to effective teamwork and to saving time. Noone suggested to us that, as a recipient, they resented the sender having this status information. This is a most important result in view of the fact that many systems do not include such a facility or make it an awkward to use option.

Users stressed that the CBMS permitted them to record and circulate many ideas and questions that would otherwise have been lost. They were able to give expression to these thoughts as they occurred without the fear of disrupting either the work of their colleagues or their own ongoing activities. This was viewed as a major benefit of CBMS use and the source of improvements in the user's job performance and job satisfaction.

Interviewees felt that they were giving better considered, and expressed, responses to requests for opinions and decisions. This was the result of setting aside a particular part of the day to respond to messages rather than being interrupted throughout the day, as had been the case before the introduction of the CBMS. They felt they were able to concentrate better on the problem, to recall the context from which it had arisen, to remember other related matters and to think through alternative responses.

Both the improved decision making and the increased circulation of creative thought, reported above, were perceived to represent an important increase in their personal effectiveness.

Higher-level personnel felt that they were becoming aware more quickly of incipient problems and increasing their awareness of activities in work units other than those under their control. These results support Olson and Lucas' [2] proposition that a CBMS might improve the level of interdepartmental coordination and the upward flow of communication.

Users felt that, both as senders and receivers, they were able to get to the point more rapidly and complete the communication activity in a shorter time. This is clearly part of a unique etiquette which has developed around the use of the CBMS as it does around all modes of human communication.

5.5 Miscellaneous Observations

In this section we briefly present several results of our personal observation which, while not based on measurements, nevertheless seem worth recording.

Ability to type did not seem to be a factor in influencing peoples' usage of the system, perhaps for two reasons:

1. the norm was to send very short messages, and
2. at least one very senior person, who used the system extensively, was a poor typist and his messages showed it; this encouraged the view that,

if it was alright for him to type poorly, then noone else need worry.

System A had a small subset of its commands which were easy to use and remember and were sufficient for basic operations. In addition, the system was reasonably fail-safe; for instance it automatically kept a record of messages sent, and those received and read, for a period of time. This is a function which requires careful use of a file system in many other systems. As a result, most people required no training other than that available from a combination of a short manual and assistance from peers. Thus a potential barrier to access was avoided, particularly for senior people, who might not have been willing to devote time to training.

Service was offered first to those who were keenest to try it. Many senior people were among these, perhaps because they suffered the highest level of frustration in their communications. This set an example for lower levels. Holdouts were not forced to join. After a few months most former holdouts joined voluntarily, having discovered that they were losing touch with what was going on, as an increasing proportion of communications was carried by the system.

6. Guidelines for Implementation

As a conclusion to our paper, we suggest a number of guidelines, which flow from our experience, and which should be of use to management in preparing an implementation of a CBMS in an organization. We also give a brief discussion of costs and benefits.

We found the following factors to be indicators of an organizational environment in which a CBMS will be beneficial and likely to be readily accepted. Not all are necessary conditions, a small subset may be quite sufficient justification.

1. General difficulty in reaching people by phone.
2. Distribution of the organization across time zones.
3. A requirement for communications for people in travel status.
4. Problems with a high level of interruptions to other work for communication purposes.
5. Corporate encouragement of open communication throughout the organization.
6. A need for continuing corporate response to a rapidly changing external environment.
7. Corporate dependence on creativity, innovation and the free circulation of new ideas.

In selecting a suitable system, many factors need to be considered and most of them are beyond the scope of this paper, since it was not our purpose to evaluate technical characteristics. Nevertheless, two desirable characteristics emerge from our study:

- An automatic message tracking capability provides a valuable aid to productivity. It was highly valued by the participants in our study.
- A system which offers a small subset of commands, adequate for the novice and the infrequent user, and which provides fail-safe operation, makes it easier to get started and requires minimal training.

In the firm we studied, capital costs, and the risk of loss if the system had not been successful, were kept low by using a public service. In addition, the use of a public service minimised the technical difficulties of getting started and the requirement for in-house resources devoted to maintenance. The ready availability of public, packet-switched network services in other countries, where the firm had plants, ensured a convenient means of connecting all plants to the message service. As the use of public message services grows for inter-company communications, this will become a progressively more attractive internal approach. Where an organization is contemplating adopting other forms of office automation simultaneously, it will often be feasible to incorporate an in-house CBMS. Nevertheless, it is well worth giving consideration to the advantages of a public service.

Several guidelines for rapid and successful adoption of a CBMS flow from our observations and experience.

- If a public service is used, select one that charges primarily on the basis of message volume and has a small, or no, charge per account. This removes the temptation not to include everyone and supports the next guideline.
- Do not disconnect low-volume users; if they have to be contacted in other ways, the overall value of the service is reduced.
- Do not force reluctant users, especially senior ones; if the system becomes a success, they will change their minds without overt pressure.
- Ensure that all users have convenient and assured access to terminals without having to disturb others.

- Provide informal support in each group of users by ensuring that at least one member of the group is familiar with the system; back-up for more difficult problems can be provided by an advisor who responds to messages requesting help.

Evaluation of costs clearly depends greatly on the technological approach taken. Our experience indicates that a cost of $15 to $50 per month per active account is a reasonable ballpark. As discussed above, the cost for relatively inactive accounts should be kept low by selecting a service which permits this.

Attribution of value to benefits is, as usual with office technology, considerably more difficult and calls for the exercise of judgement. There may well be direct reductions in some costly activities, such as the use of memoranda, but such savings may result in support staff carrying out more demanding and valuable tasks rather than a reduction of costs. Most benefits are not directly measurable in dollar terms. They are of the type illustrated in our section on results: better informed staff and management; reduced duplication of effort due to better information; more rapid response to customers and to competitive conditions; increased circulation of ideas; better decisions and so on. The attribution of value to the reduction of problems and the exploitation of opportunities in such areas is clearly a management function which cannot easily be delegated and depends very much on the circumstances of the company.

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