Power and Influence: Computers and Communication for Effective Library and Information Services

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Abstract

This paper introduces some reflections on the centrality of communication processes to all organisations, and its overwhelming significance to those providing library and information services, derived from experience in systems analysis and organisational development in the U.K. and Israel. The extension of the problems and potential effectiveness that computerised STI systems afford both in the communication content and in the communication practices of libraries and information services are illustrated, and some implications for action are indicated.

Introduction

Communication between people, and interactions between people and sophisticated computer-based systems pose questions of power and influence of vital concern to the effective provision of library and information services. An effective organisation is one that is flexible enough to make adaptive changes to a changing environment. The power to adapt derives from the quality of communication within the organisation, and between it and other organisations: the influence of effectively communicated organisational realities. The situation is compounded by the pressures to extend human communication skills by the use of computerised information storage and retrieval systems. In using these systems not only is the communication content of a service enhanced, but the information transfer process between computers and people extends our awareness of basic human communication needs and processes by requiring explicit definition of information search statements, retrieval language structures and man-machine dialogues.

The potential impact of man-machine communication can be only dimly perceived. The interactive use of large data bases and data banks on-line, computerised library procedures and STI networks, teleconferencing and computer-aided instruction, to name just a few developments, will tax the abilities of library and information-based organisations to adapt sufficiently to provide effective services in a new and challenging environment, while providing the very tools required for such services.

Implicit and Explicit Information in Organisations

Some years ago, in an Aslib study provoked by the availability of MARC records from the Library of Congress and the British National Bibliography, I analysed the procedures, activities and tasks involving the use of all kinds of bibliographic records, or forms, in libraries. The aim of the study was to ascertain the elements of bibliographic information used in libraries, the records they appeared in, and the way in which the records were used so that we could answer the question: "Is the set of bibliographic elements included in the MARC record an optimum set?" and derive some guidance on how best to use such a record.

There was no simple answer. Even at this routine level of information processing, using forms in libraries, the difficulties involved in describing the work, and the importance of implicit information and the individual's personal experience and subjective assumptions and values, have been underestimated.
In addition to the importance of elements of administrative information such as dates and order numbers, it became clear that many bibliographic elements entered on the record have no procedural function, they do not serve as keys for sorting, selecting or other activities. Many actions on the form are not signalled by any element recorded on it, but are taken because of the point that the form has reached in the overall sequence of procedures. The procedural context, as well as the set of explicit elements of information in the record, signals the action required.

Procedures are dependent on implicit contextual information provided by the presence of a form in a particular file, or pile of forms at a certain time, by the set of elements present, and sometimes by the absence of certain expected elements, and by the often unformulated and implicit lessons learnt through an individual's place in the system and experience of the job. Different users of forms, and even the same user at different times, will all derive different information from the same form. Different elements of description will have more significance for them according to their purpose in reading the form. Booksellers, acquisitions librarians and library users will have different information needs from the form according to the select, order or search procedures they may be following.

Very little is done in a library without reference to some form or verbalised bibliographic description relating back to a specific document or documents. The analysis of the use of bibliographic records in library procedures, defining activities, tasks and elements of information, led to the development of a functional model that covered eighteen procedures common to all types of library and information system involved in the acquisition, processing, use and maintenance of bibliographic materials. (1)

The model, and methods of analysis, are of direct use in any systems study of library procedures, and can aid documentation of current procedures, in systems design and rationalisation of routines and paperwork, training programmes for library staff, and the preparatory analysis needed for the introduction of computerisation.

The procedural model was translated into GPSS, a high-level programming language, for computer simulation of library systems. (2) A computer simulation model, indeed any activity involving computers, demands a high level of consistent, explicit definition. In return it offers a correspondingly powerful tool for systems analysis, design and experimentation.

The primary concern in developing the computer simulation model was to produce operational statistics on the performance of the described system over a stated period of simulated time to provide information for management decision making. Computer simulation models allow us to manipulate descriptions of systems, or parts of systems, to learn more about how they function and to predict how they might react to change. This gives us the chance to experiment, to vary decisions and activities, and to see the likely effects of these before changing things in the real organisation. Comparing the performance of variants in a simulation model of operations is far simpler than changing things in the real world over and over again in a process of trial and error.

Once the programme specifying the simulation model has been written and is available in machine-readable form, it only takes actual minutes to simulate activity periods of months, or even years. As no individual learning or unlearning period occurs in the simulation run, the performance of the variants is directly comparable. The model allows us to learn by experience, or at least by simulated experience, and to discover the likely consequences of our decisions without damaging the actual system and without spending long, costly periods of time in observing it.

The conceptual model of library procedures was originally derived from analyses of actual libraries. The generalised model abstracted from these analyses was the basis of the pilot simulation project. Effective planning, organising and controlling work in a library depends on the information available about past and present activities. An analysis of these activities is therefore a prerequisite to any attempt at refining quantitative performance goals. Concrete statements of the work that has to be done,
detailed objectives, volumes of transactions, users demands and staff availability aids coordination and the rational allocation of work in the most effective manner.

The amount of information that can be collected about the performance of a system can provide managers and analysts alike with an embarrassing wealth of paper, which must then be organised and interpreted. The construction and manipulation of a model is a recoding process allowing us to create simplified representations of complex realities which are therefore more amenable to exploration and experimentation than the real world. Understanding of the model may then lead to the development of solutions to problems in the real environment, and guidance given on choosing between the options available.

The library model provided management information in the form of histograms showing the utilisation of the time of each of the library assistants, queue statistics showing where delays were occurring and backlogs of work developing, time spent on issue counter work, cataloguing, classification etc., and tables showing the length of time various transactions have been in the system, and the average contents of each temporary storage or filing point.

The pilot simulation model, and subsequent testing in an educational type library setting, shows that given the basic library system description, it is possible to translate this description into a form that can be simulated on a computer. We can use the power of the machine to augment our understanding of the operation of the system, and to collect operational statistics and predict the effect of certain predefined changes on that system. The model can be used as a primarily explanatory device, or as a predictive model to crystallise the effects of budget cuts, personnel changes, and the buildup of backlogs of work. It may be used to project increased workloads on existing systems, reflecting the effects of staff placement and procedural requirements, or to assess the suitability of new operational procedures - an experimental environment for systems design.

If describing the purposes and activities involved in individual library procedures is difficult, describing social phenomena, the behaviour of man himself pursuing these purposes in relation to and in interaction with other men, the difficulties become even more complex. Each person's perception of the universe is unique, and communicating one's subjective experience of reality to someone else is extraordinarily difficult. The common theme underlying many recent and not so recent management techniques seems to be the necessity for encouraging groups of people both within organisations and drawn from different organisations to communicate effectively about their work, to share definitions, analyses and attitudes about what they are trying to do together, and why they are trying to do it, and jointly to devise and execute plans of action to achieve these objectives.

Having spent some years in analysing library and information tasks, activities and procedures, and exploring the complementary concerns of librarians as managers, having experienced the difficulties encountered in describing one's work in any consistent level of detail and the centrality of communication problems to all of these aspects of organisational life, my interest shifted in focus from the work that has to be done to the people who do it, and the way in which they do it. If it is difficult to describe routine procedures because of the implicitly learnt aspects of the task and its context, and the individual's experiences, skills and expectations, then it is even more difficult, and perhaps even more necessary, to begin to talk about purposes, missions, objectives and goals.

In the process of receiving information we interpret and judge. We operate on assumptions, attitudes, values, judgements and preconceptions that we are for the most part unaware of. Organisational life is, of its nature, busy. It is easy to get caught up in the business of day to day routines and escape the hard work of trying to make explicit for ourselves and our colleagues the values and assumptions on which we are operating, and which we assume we all know and share anyway.
The essence of good management could be defined in this context as getting people to work together happily and therefore effectively. There is certainly in the Western world, an increasing awareness that without an acceptable degree of job satisfaction, people are unlikely to work as effectively as they might. Dissatisfaction can lead to alienation and withdrawal, or even to active sabotage. As Enid Mumford says, "a system that is designed to achieve objectives defined solely in technical terms is likely to have unpredictable human consequences". (3)

The urge to communicate and the necessity for effective communication is basic to every cooperative human endeavour, and should therefore be a subject of vital interest to employers and employees alike. "The forms of a person's thought are controlled by inexorable laws of pattern of which he is unconscious. These patterns are the unperceived, intricate systematisations of his own language, and every language is a vast pattern system, different from others, in which are, culturally ordained, the forms and categories by which the personalities not only communicate, but also analyse nature, notice or neglect types of relationship and phenomena, channel their reasons, and build the houses of their consciousness." (4)

One of the major benefits derived from organisational research, consultancy and model building is the opportunity given to busy organisational men for self-questioning and reappraisal, and for communicating ideas. Management techniques like Management by Objectives, Planned Programmed Budgeting Systems, Organisation Development and management and staff development programmes, all require time for an individual to talk about his work and its purpose, and to make explicit and question his implicit assumptions. Systems analysts and organisation and methods experts have long been aware that the best suggestions for work methods improvement come from the people actually doing the work, once they are given the opportunity and the encouragement to think about it. In addition, because of this involvement, any improvements will be more readily implemented. An extension of this principle, brought into focus by O.D. practitioners, is the sharing of perceptions and concepts within the working group.

If it is enlightening to talk about one's job with a systems analyst, it can be even more illuminating to discuss it with a group of people doing similar work. The variety of assumptions about a job's purpose, and interpretations of priorities and methods can be very surprising to people involved in such a discussion for the first time. It can even be somewhat disturbing to any manager involved. The clarification of these concepts, however, is the invaluable benefit to be gained: the shared communication about the work and its contribution to the organisation as a whole, and the consensus of opinion on objectives and plans for improving performance is not only exhilarating for those involved, but can be a creative force for more effective organisational life. I say can be, because there is a note of warning. People talking freely to each other about their work and their shared problems can generate involvement, commitment and motivation, but the enthusiasm should not be allowed to evaporate. Some action on recommendations for improvement should be seen to take place as quickly as possible, or frustration, disillusion and cynicism can set in. With all credibility lost, the next management effort will also be doomed to failure.

I learnt the force of some of these principles by putting the ideas into action and participating in the introduction of a Management by Objectives programme in an educational type library in the U.K. and a systems analysis programme at the Technion in Israel. As in many large library systems, there were serious communication problems, exacerbated by the number of separate branch and departmental libraries.

Group meetings with all staff involved in similar work at comparable levels throughout the system were held, bringing them together to discuss their work and agree upon consensus statements of objectives and problems.

Increasingly people are expecting more from their work than pay and economic security. Management scientists now say that organisations may expect a handsome return in performance for efforts they make toward the improvement of the quality of life at work. There are, however, still gaps in the practical knowledge needed to effect social
changes in organisations, and differing attitudes towards them. Authoritarian and rationalistic traditions die hard. "Library administrators themselves will also have to become familiar with the concepts and analytical tools which are necessary for organisational development, so that they can understand what the organisational development specialists are saying and so that they can make some use of the tools themselves" (5) - another exercise in communication.

We do not yet have any sophisticated device for measuring the contribution of the questioning approach and the sharing of communication about the task and its objectives, although questionnaires have been developed that can identify shifts in attitude before and after such programmes. Proponents hope of course for changes from negative or diverse to positive and correlated. Such questionnaires can confirm or discredit subjective assessments gathered through interviews and observation, and can indicate areas of ambiguity in perceptions of situations or policies that might usefully be clarified. Potential conflict areas between groups and departments can be identified, and contribute to an understanding of the organisation and its situation.

Effective management requires an understanding of the human system. As a field of study concerned with people living and working together in a social environment, it must be dependent on insights and knowledge derived from the behavioural sciences while not ignoring the technical aspects necessary to keep pace with the increasing rate of technological change affecting all organisations: the socio-technical systems approach of the Tavistock Institute. (6)

Computerised STI Systems

Scientific, technological and sociological information sources are so vast, and growing so rapidly, that modern technology must be used in making it accessible. The power of the computer to store and manipulate data and aid the information processing tasks of man provides a means to cope with the information explosion while at the same time it poses significant problems and raises many unanswered questions about the complexities of human communication.

"During the last 20 years substantial progress has been made in designing means whereby men can effectively use computers in solving problems. Languages have been developed that mirror the task rather than the computer's internal structure. Operating systems now exist that allow the user at his terminal to transmit instructions and receive responses from the computer within seconds. Communication networks have been created that make it possible for the man and the computer to carry on their conversations regardless of distance. Storage devices are being developed that allow immense amounts of data to be stored economically and accessed rapidly." (7)

Automated systems allow the large numbers of documents endemic to library and information systems to be handled more economically than traditional manual processing methods but, more importantly, they allow information retrieval from a significantly larger variety of viewpoints and interests than is the case conventionally. Translation of user retrieval interests into the language of the document and the document content description is the key problem facing automated library and information systems, as it has always been the key problem in manual systems.

The computer allows more latitude in the number of access points to a record than the old card catalogues could and, as storage devices become more powerful and less expensive, allows on-line access to abstracts as well as bibliographic citations, but retrieval language elements still require a certain degree of organisation, and document record entries on the machine files must reflect users' interests.

Computer aids to systems use are being developed and it is possible to prompt the user on programme procedures and on terms used in particular data bases, as well as providing information on intermediate results, such as number of citations retrieved by a specific search statement and total items in the data base. Truncated search terms can be used, and various formats for off-line printing of interactive search results. Computer
responses can be provided in varying degrees of verbosity, from the 'bedside manner' of medical diagnostic computer systems to the symbolic, short or long forms of current bibliographic retrieval systems, according to the psychology and the experience of the user.

In order to use the capabilities of the computer, a precise and detailed analysis is needed of the functions it must perform, a more explicitly detailed analysis than for human comprehension. A computer can only do what human programmers have instructed it to do. It has no 'understanding' of the data and instructions it deals with, no tolerance for implicit information. Its power for information retrieval lies in the speed with which it can handle very large masses of data to retrieve only those items that match specifically pre-defined requirements. It depends on the ability of human skills to formulate these requirements in an efficient and effective manner. The original systems designers must comprehend the systems needs and the psychological needs of the users so that the individual may be taught the structure and capabilities of the system and how to formulate effective search statements - using the power of the system to handle large masses of data and the interactive capabilities for feedback during the course of the search.

The synthesis we strive for is the combination of man and machine in a carefully meshed interrelationship of functions: the computer storing the data elements it is instructed to and then searching its files for data matching the expressed information needs of the decision-making user, the two interacting by means of formalised dialogues carried out at a computer visual display or teletype terminal.

Computerised STI systems pose new problems then, both in the effective use of these new tools and in the demands made on library staff and users in making explicit their information needs. There are systems languages and structures to be learnt so that basic communication with the computer files through on-line interaction may be accomplished. There are search strategies to be designed for retrospective searches of large files of bibliographic references, according to the rules of the information retrieval languages and the specific data base involved. Subject interest profiles must be designed for current awareness services and statistics kept on system performance.

The content of communicative transactions is augmented, but the form of communication is more restricted. Not only must the individual know which elements of information are to be entered, searched or retrieved, he must also know and use the standard form for each element, ("organisation" for an Englishman will retrieve nothing if the data base is American and the key term 'organization'), and the sequence of terms to formulate a search question, enter a new record or query programme definitions.

And all the time, there are additional strains on the communication processes of the organisation. Quite apart from the system perturbations attendant on any form of organisational change, computer functions must be tailored to organisational functions, staff trained, and rumours and forebodings dispelled. New skills must be learnt, adjustments to departmental and task priorities made, and the tenuous refinements of status and authority levels accommodated.

Conclusions

The power of effective communication (i.e. sharing and acting on shared views of objectives, priorities, procedures, organisational strengths and weaknesses) and the influence of computerised systems in achieving flexibility and survival can be illustrated by Marsh's categorisation of sources of power. (9) Besides the traditional power of 'authority', strengthened by the traditionally hierarchical differential allocation of authority and responsibility, and the resulting organisational power and influence networks, the formal communication lines and the informal grapevine, he lists centrality, pervasiveness, information, control and expertise.

His definitions of these concepts demonstrate their potential relevance to library and information units:
- centrality - people and departments who are involved in important decisions more often than other people and departments will have more power, irrespective of their place in the hierarchy;
- pervasiveness - people and departments who have many contacts throughout the organisation will have more potential influence than those who have little contact;
- information - people who know more are potentially more powerful than those who know less;
- control over systems - people who know about and control machinery, computer systems etc., have more power than those who do not;
- expertise - if you are expert at some aspect of the business you will have more influence than those less expert than you.

The library or information service achieving good communications, shared beliefs in the purpose of the unit, the needs of the users and the procedural priorities, and successfully absorbing the new technology of computerised STI systems, can mobilise this potential. They will gain in organisational strength and will offer more effective services. They can become not only sources of information, but also actively participant forces in the development of the flexible and adaptable organisations required in what Brzezinski has termed, this "technetronic era."

References