

Organisation of Information Systems : An Introspection of Present Premises, Presumptions and Practices

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Discusses lack of clarity of objectives of information systems, inadequate level of understanding of information requirements of users, exemplifies the nature of work of scientists and engineers and the consequent purposes of seeking information by them, put forth with few examples the lacunae in the present way of organisation and retrieval of information. Concludes by highlighting the need-based approach in design and operation of information systems for space scientists and engineers and recommends establishing an 'Information Systems Planning and Assessing Cell'.

1 Introduction

The theme of the seminar 'organisation of information' implies organisation of information and its embodiments so as to keep some records of suitable information in terms of contents, format, level, language, etc. for the purpose of dissemination and distribution of information. The theme also presupposes knowledge of information requirements of space scientists, engineers, technicians and technologists. When we talk of information requirements, we have to be clear about various sectors like social, recreational, educational and work-related technical information requirements even though they are not always mutually exclusive. Here we are concerned mainly with organisation of work-related technical information than others. We are also confining, very unfortunately, to

organisation of public domain written information. The internally generated information, classified information and informal communication flourishing among our users are, by and large, kept aside by the profession.

2 Lack of clear objectives of information systems

Very rarely information systems in this country have clear, consistently laid down scope and objectives. They have more of hidden and derived objectives than laid down objectives. Some times it gives doubt whether our libraries (and technical information centres) are kept as part of welfare activities or as a fringe benefit to employees or as a centralised way of providing xerox and printing services and budgetary and expenditure control over reading materials. The cognizable roles libraries/information systems have

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to play in realising the objectives of the organisation and enhancing the work performance of its employees need to be spelled out before designing, organising and operating them. Today the objectives of most of our information systems are implied and assumed but not authoritatively defined and set. This flexibility allows stretching of idiosyncracies, whims and fancies and inducting conveniently called good and bad things to information systems. Unless the policies and objectives are stiffly defined, it may be difficult to steer an information system through cumulatively effective and efficient growth and performance.

3 Inadequate understanding of requirements of users

Having no clear laid down objectives, it is no surprise that we do not have clear understanding of information requirements of our users and we have not had sound user-studies. Even though considerable research has been done in the area of user-studies in developed and information rich countries, especially U.S.A., Britain, Western and Eastern European countries, practically nothing substantial is done in less developed countries in general and India in particular. Not even a single major user-study in any of the areas of science and technology has been done in the country. Even the design and establishment of major national information systems were not preceded by systematic, reliable and comprehensive user-studies. As such many present systems are surviving under 'symmetry of ignorance' (Kunz et. al., 1977, p67-68) mathematical induction of convenient good or bad

things, subjective considerations and idiosyncracies of people involved in planning information systems. Other systems are thriving under dubious reasons of avoiding the duplication of research and resultant economic benefit arising out of information systems but the hidden apparent reasons of an information system could be treating information system as prestige centre or a form of fringe benefit to employees or a paid up insurance to serve an unanticipated need or to sublimate the feeling that one does not read or a centralised way of budgetary control over expenditure on documents (Myers, 1970, p26). There is a dire need for conducting scientifically based studies that will help define information-needs of given set of users (Saracevic, 1980, p226). Unfortunately user-studies are considered in this country as academic work of librarians and not as a process of designing and operating information systems. Some piecemeal studies done are also not carried out by persons 'living with the tribe' but by teachers and students of library schools.

4 Nature of work of scientists and engineers and the purpose for which they seek information

Having noted lack of clear objectives while organising information systems and lack of clear understanding of the user requirements, let us look at the nature of work of scientists and engineers and for what purposes they seek information. The nature of work of users and the different roles they play are the starting points for understanding the information requirements of a given set of users'. For

example, the limited use of journals by engineers is attributable to the fact that engineers do not encourage the continuous integration of new ideas within existing practice (Wolek, 1969). They spend 90-95% of a project time in prototype phase compared to limited time (5-10%) spent on systems-definition phase and try to build not the 'best' but a 'better' technology than before by focusing on a limited number of alternatives. The prototype model becomes progressively more 'frozen' and decisions irrevocable as the project progresses.

Menzel and Voigt have given two fundamental, and yet different, ways of grouping purposes of seeking information. The functions or purposes of seeking information identified and related to sources of information by Menzel (Columbia University, 1958) are :

- (1) Keeping abreast of current developments, (2) Brushing up or reviewing the recent years' work in an area, (3) Certifying : giving testimony to the reliability of a source of information, (4) Redirecting attention : broadening one's area of attention, (5) Eliciting reactions or feedback to own statements or assertions, (6) Locating : accessing the position of one's topic or orienting one's own work within the totality of research endeavours, and (7) Answering specific questions for further research.

The three broad approaches in seeking information identified by Voigt (1959) are :

- (i) Most scientists spend a large portion of their time with the purpose of knowing what other scientists have recently done or are doing, to keep up-to-date with the current progress and to give meaning to their own works, and it is called the 'current approach' (comparable with purposes 1,2, and 6 of Menzel).
- (ii) The next greatest use of information by scientists arises out of 'everyday approach' for which information centres and bibliographical services are of a limited use¹. The 'everyday approach' arises in the course of work requiring specific piece of information, a bit of data, a method, information about apparatus construction, an equation, an explanation of an observation, etc., and this is largely met by inter-personal discussion with colleagues (comparable with purposes 3,5 and 7 of Menzel).
- (iii) The 'exhaustive approach' (where 'exhaustive' is a relative term) arises less often and has the purpose of knowing current research in progress and depends to a great extent on formal and documentary sources of information. This need arises more with pure scientists than applied scientists and at the time of starting a new investigation, presenting results in the form of reports, writing a paper, preparing for a talk and submitting patent application (comparable with purposes 1,2,4 and 6 of Menzel).

¹This is not to underestimate the equally significant role played by attributes of individual users. In fact the dependence on literature was found to be related more to the problem-solver than to the problem (Scott, 1960, p61).

Surprisingly, Wood and Ronayne (1972, p12-13) found that chemists in their sample sought information for recreational, habit motives and for the purpose of maintaining a sense of social contact with other scientists (i.e. conversational and social use).

Menzel (Columbia University, 1958, p67 and 80) in an exploratory study found that self-scanning of journals was ranked first by 67% of the respondents for keeping abreast with current developments. Menzel also introduced the concept of 'radius of attention' to specify the breadth of the area within which scientists feel responsible for keeping abreast to varying degrees. In another study (Case Institute of Technology, 1960) physicists read journals for specific information 58.7% of the times (as against 35.5% in case of chemists) and the rest of it was undirecting browsing. Rosenbloom and Wolek (1970, p39-42) found that 47% of searches were for problem-solving information, 21% for competence-oriented searches and the engineers (53%) were slightly more likely to undertake a specific search than scientists (42%) and far less likely to try and improve their general competence (17%) than were scientists (25%). The lack of a sufficiently strong motive to keep as fully informed as possible (Parker, 1973, p10-11) and collecting information for more than one purpose with majority collecting procedural information for design/development projects (Garg and Ashok Kumar, 1984, p70) were also noticed in two different studies. In a study of information-seeking behaviour of the

space technologists (Sridhar, 1987) at ISRO Satellite Centre (ISAC) it was found that the requirements of S & T news and basic S & T information have ranked high for the space technologists. In addition, the space technologists seek more of theoretical background, experimental results, methods, processes and procedures, product, material, equipment and apparatus information and physical, technical and design data (in that rank order) than state-of-the-art, review literature, standard and patent specifications. Further details of the results of this study will be presented under information requirements of the space technologists of ISAC in another paper.

5 Lacunae in present way of organisation of information systems/services

With lack of clear objectives and sound user-studies, what is designed, organised and operated is either based on theories of librarianship or whims and fancies of few outspoken persons including librarians. There are a number of areas wherein the presumption, premises and the resultant practices need to be reexamined by us. I will cite a few common examples.

51 'Retrospective' current awareness services

Firstly, many of us have a ritual of publishing(?) list of additions and other current awareness bulletins. A large majority of them do not attract the potential users and they are not much used by either users or nonusers of the respective libraries. The current aware-

¹The fallacy in thinking that the solution to documentation problems lies in large national or regional information centres stems from the erroneous belief that a scientist generally needs all or most of the information available on a subject which is not true as far as everyday approach is concerned. Large information centres are of limited value as far as this approach is concerned (Voigt, 1959, p185).

ness services are mundane, less attractive, bulky and often obsolete and only add to 'information overload' of scientists and engineers. Tailoring them to smaller user groups, making them really 'current', and creating a healthy competitive spirit among users having similar interest through these current awareness services is necessary. One will be surprised to see many such lists carrying bibliographical details of six months to one year old acquisitions perhaps of two-three year old primary documents.

52 *'Ornamental' abstracting and indexing journals and library card catalogues*

Owing to the nature of work and type of information required, space engineers do not use abstracting and indexing journals. Many such secondary journals are helping libraries only in compilation of large and comprehensive bibliographies and at times in procurement of primary documents. Right now information technology offers some effective substitutes for these costly and bulky secondary journals.

If only we attempt to see how our catalogues are used we would have discarded many parts of them like classified catalogue, author and title indexes to reports, etc. (Sridhar, 1986) saving substantial time of professional manpower in preparing and filing these cards. But we have a great belief that all standard approaches will be used by users in accessing all types of documents. We will be surprised to know that in majority of the cases our users prefer either to directly browse the shelves or to consult a professional colleague

rather than using card catalogues and consulting library staff. Somebody has even made fun of us by telling that cataloguing has become handicraft in this country (McCarthy, 1975; Jones, 1984, p29).

On the other hand, users do get bibliographical references as well as actual information accidentally in an unplanned and unintentional browsing or skimming through reading materials or while discussing something else with colleagues. These 'lucky accidents' do bring useful information as much and as frequently as what a deliberate search in an organised information system brings and pose a challenge to formally organised information systems. Yet there are ways to facilitate and even increase these most desired 'lucky accidents' among users.

53 *'Exhaustive' services/ 'Everything' on the earth on a given topic*

Disregarding the different purposes for which information is sought by engineer and assuming that only the 'exhaustive approach' of academic and pure research nature is predominant, we believe and provide, as a rule, exhaustive bibliographies on a given topic even though users need and can afford only a short list of latest references. We wrongly believe that utility and professionalism of the bibliography compiled increases with its exhaustivity. Unfortunately this is one of the three criteria (the other two being pinpointedness and expeditiousness) to which we are wedded in our library schools. Most of the systems are designed based on 'exhaustive approach' whereas engineers are more inclined to 'everyday approach'.

54 *'Surrogate' mode of service*

We are fond of providing surrogate mode of service and traditionally reference mode and lending mode of service from libraries. We do not have a direct mode of service wherein a document is circulated amongst potential users. Our authoritarian, custodian and audit-feared minds do not allow us to think of circulating journals, reports and other materials directly to the users concerned. Indirectly we are glorifying to become store keepers than information providers. As such we carry out the ritual of stock verification with nightmares of loss and mutilation of documents.

55 *Internally generated information and informal communication*

Formal information centres and libraries have, by and large, ignored organisation of internally generated information in the form of reports, papers, drawings, photographs, etc. As a matter of fact three information systems within the organisation compete each other in fulfilling information requirements of engineers. First, what engineer keeps in his head together with his personal collection and departmental collection claims the top priority. Secondly, colleagues/peers, superiors and a large host of professional counterparts elsewhere who constitute the informal communication domain dominate information scenario of engineers. Lastly, dormant public domain written information with all the rules and restrictions of its artificial arrangement and organisation is unable to attract and impress engineers who need information.

It is not necessary that libraries have to destabilize personal and departmental collection of engineers in order to organise internally generated information, but it can build even an archival less frequently used exhaustive collection to supplement personal and departmental collection. At the outset the informal communication domain of scientists and engineers appear totally unconnected to libraries but libraries can play an indirect role in facilitating better informal information transfer.

At this juncture, it is better we look at how the space technologists at ISAC have depended on personal and departmental collection for information from the study cited earlier (Sridhar, 1987). It was found that a majority of middle level and higher level space technologists have their own collection of literature, references and notes. Many a time the personal collection and the departmental collection are not clearly segregated and hence are indistinguishable. A large part of the personal collection consists of free materials like preprints, journals, trade catalogues, standard specifications, reprints, reports and notes in the form of loose sheets or registers or note books with no organisation for later retrieval. The departmental collections usually have handbooks, priced as well as free trade catalogues, standard specifications and manuals needed for day-to-day working in addition to a large passive collection of internal reports, gratis reports and reprints. Two to three departments were found to have quite extensive collections with little organisation.

A large number of latest product catalogues are accumulated in purchase-files in the process of procuring equipment, components and materials. Unfortunately, they end up in a systematic 'burial' in the central purchase division in the respective 'closed' purchase files unless the indenter takes extra care to remove and transfer them to an appropriate collection.

The significance of personal and departmental collections to the space technologists is reflected in the following selected statements made by them :

"I get most of the information required for my work from the departmental collection and from books in the library". "For my work of co-ordination and interface control, first I will look into the internal design documents and if the information is not sufficient, I will contact the designers". "Almost all information required by us are in the MIL specifications kept in the division". "I get technical information from catalogues supplied to me by the manufacturers". "The information required for my work is gathered mostly from MIL specifications, books, trade catalogues received from the manufacturers and from my senior colleagues". "I get all the information required from the MIL specifications and some information regarding components, etc., from manufacturers catalogues". "I try to maintain my own reprints, books and journals

library in the division with a proper cataloguing."

Due to security reasons or lack of clear policy on security classification many internally produced documents are not yet collected, processed and organised at one place within the organisation.

56 *Making 'Less used' much less used*

Lot of less used and ephemeral literature like microforms, technical reports, reprints, preprints, trade literature, etc. have not received serious attention in libraries under the pretext that either they are free materials and freely available directly to users or they are very less used in the libraries. The converse of 'success breeds success' phenomenon has created this vicious circle wherein less used material is not systematically organised and often remotely and compactly stored or preferably bought or kept in less usable form (e.g. technical reports in microforms). And they are accused as less used materials.

57 *Overexcitement of media, tools and means and under-utilisation of information technologies*

The present way of organisation of information is, by and large, carried away by immense attraction of media like microforms, optical disks, tools and means like online-access, computers, etc and the goal has taken secondary position. Over decades experimental computerised services, online access, etc. are carried out without much of cumulation of

experience of improvement in quality and quantity of services. As on today, tremendous under-utilisation of these tools and means can be seen everywhere. As I drafted this paper, there arrived on my table a computer-printout monthly list of acquisition of a national information centre dated January 1988 (i.e., after 8 months) covering documents published mostly in 1985 and 1986. Such a list can only be of historic or academic interest. It is not difficult to find out places where computers are used like typewriters under the name of computerisation.

58 *Lack of 'Objective' assessment of information systems, services and subsystems*

Lastly, not only libraries and information centres have been designed without clear understanding of objectives and requirements of users, but also they are operated without systematic and objective evaluation. With the absence of proper feedback and evaluation anything can be said about any system or service.

6 Conclusion

Since it is a critical introspection of the existing system, I have deliberately avoided discussion of positive aspects of the present systems in this presentation.

Information, being a critical input for R & D as well as industry, requires greater attention in the framework of overall objectives of an organisation. Just like one plans for future projects and programmes, the anticipated requirements of information should be assessed and planned in advance.

ISRO, as a mission oriented organisation carrying on time bound projects and technology development programs involving high technology, requires information services which are quite different from traditional services. The design of such a system should essentially be based on requirements of users assessed through sound user-research. Systematic user-studies covering the nature and type of information required and the ways and forms in which required by several thousand scientists, engineers, technologists and technicians of ISRO should only guide design, organisation and operation of information systems and services.

A detailed and systematic collection of data on various factors and stock-taking of available collection, facilities and services to identify lacunae, avoidable duplication of efforts and services, and to pin-point the scope of different services are necessary. "One of the most difficult problems facing the library development planners is that of collecting and analysing the data on the existing library situation which he needs in order to prepare sensible plans for development" (Parker, 1983, p10). Considering the geographic decentralisation of ISRO, coordinated approach rather than full centralised or fully decentralised approach would be ideal in the endeavour.

I take this opportunity to suggest establishment of a ISRO level 'Information System Planning and Assessing Cell' which can carry out user-research, prepare long-term plans and evaluate the existing systems at

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I take this opportunity to suggest establishment of a ISRO level 'Information System Planning and Assessing Cell' which can carry out user-research, prepare long-term plans and evaluate the existing systems and

services. The success of such a cell depends much on how actively the individual libraries and information centres within ISRO involve themselves, the extent to which reliable data will be made available to the Cell and the spirit with which results of user-research, plans and evaluation reports are implemented.

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