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MEMORANDUM

To: Science Information Panel -- PSAC
From: J. Lederberg
Subject: SCITEL: A Central Scientific Communication System

Premises of the SCITEL System

A. Responsible submission of fully documented papers to a central repository is the primary act of scientific communication. With growing urgency the effective pursuit of science depends on efficient, systematic, anxiety-free, reliable access to the exponentially increasing flow of scientific information.

B. The repository should serve both as

I. an archives to implement the permanent availability and retrieval of primary depositions and

II. a switching center for the rational addressing of appropriately sampled ensembles of documents to the user population.

C. SCITEL must evolve in plausible, foreseeable stages making the fullest use of present elements and a realistic assessment of its leverage on the existing confusion. SCITEL's main advantage is an indispensable service that outdoes the alternatives. To build a critical mass the SCITEL experiment should start with a definable group of producers and consumers who badly need improved services and are already related to an agency justifiably responsive to their needs.

A. Depository Input

1. Primary deposit

The encouragement to input will be the excellence of the output services, and the utility of a deposit as a progress report to the granting agency. The repository should receive all documents submitted or certified to it by qualified entrants, namely grantees and contractors already entrusted with public funds.

2. Secondary deposit

A substantial amount of material may still have to be actively acquired, for example the foreign literature; and many papers still routed to domestic journals. The granting agency can reserve a government privilege against any copyright to reproduce reports of work generated under its grants. Reciprocity agreements with other authorities should also facilitate these acquisitions.

B. Repository Output

1. Output channels

Unlike the present system of preclusive publication SCITEL does not rely on an insulated output channel to create an unambiguous

reference for any given paper. The repository itself furnishes systematic archival continuity so that the output channels can overlap, and shift with time and changing needs. The output modes advocated here are preliminary answers to "Given a coherent flow of documents to the center what are the most effective sampling and addressing patterns to the periphery?"

2. Retrieval services: SCITEL archives and indexes

The deep retrieval services plainly called for to facilitate access to the central archives are the key to the integrity of the system. But they need not be elaborated here. The centralization of the primary deposits and the new scope of the market should facilitate and justify the most sophisticated technical developments in retrieval processes.

3. Dissemination services

Several elements which are studiously non-exclusive of one another are outlined in Figure 1. The broadcast services distributed regularly to the entire consumer population of a Scitel grouping are:

a. Current announcements by title of receipts to the depository. These should be listed at least weekly together with machine-run indexes.

b. Cumulative indexes should supersede the current announcements at frequent intervals, say every six weeks. These cumulations should also index in greater depth than the current announcements. Grand cumulations should be issued annually and quinquennially. Reliance upon titles and machine methods for simplest forms should allow for much timelier currency than would be possible for abstracting services which may well be left to their current sponsors.

c. SCITEL (Daily) journal

I. Initial stages

The entire flow-through of actual documents could be published within the scope of a daily newspaper format. It would be an expanded analogue of the Proceedings of the National Academy of Sciences and would be the main leverage to accelerate the SCITEL system.

II. Later additional filters will be inserted to keep the Daily down to manageable size but it should persist as the principle conventional vehicle of primary dissemination of documents from the center. It would then also become the habitual locus for the indexing material, for news of science, and for the kind of sample of current science that PNAS now represents to a limited degree. The newspaper might eventually accommodate from ten to thirty per cent of the total U.S. literature in a field depending on the apparent savings from eliminating the redundancy in the present diverse output. An annual flow of newsprint equivalent to 250,000 pages of conventional journal format together with a considerable amount of collateral material would be well within the scope of the main sections of the New York Times and would, of course, far exceed the capacity of any individual for intelligent

reading of the entirety.

The Daily SCITEL is intended to conventionalize the SCITEL system in the scientific community and to relieve the system of the major burden of handling paper through-put in the cheapest way. The individual reader could systematize his sampling efforts at current reading with the help of the indices, and with convenient access to the total material. As the system becomes more conventional, there will of course be endless possibilities for parcelling the documents.

The primary responsibility for seeking editorial criticism should rest upon the author. With increasing contributions, the Daily SCITEL might have to sample the total flow. However, the selection of a deposited article to appear or not in the SCITEL Daily is separate from its ultimate accessibility in the archives through the retrieval indexes. These problems are some time away: with some adjustment of the scope of the SCITEL Daily, and of basic (i.e. exceptionable) page limitations on authors, the selection problem may be averted altogether or related to the fundamental issue of financial support of the work itself.

d. Reprints of individual papers

Once a document has been deposited and given an acquisition number it will be identified in the title announcements and can be disseminated as a separate reprint, either by the author or on specific interrogation by the depository. Even if a depository article is published in no other way its reprinting is a responsible means of communication, wholly preferable to the present practice of reprint abomination which being entirely unnecessary should be castigated.

e. Ad hoc journals

Requirements of reader blocs will become evident to justify ad hoc journals: monthly collections of selected reprints in specific areas. These should doubtless be printed in more elegant and durable form than the Daily. Both the Center and, as one of their new major responsibilities, the societies might be involved in the function of selection of papers for the ad hoc journals--the latter would convey a prestige of selection missing from the system heretofore. But the switching would be non-exclusive, the same contribution appearing in several ad hoc journals, depending only on its merits to diverse audiences. This is an improvement over the minor elegant variation of one contribution placed in several journals addressed to different audiences. The depository material would be available to any responsible scientific group. The abstracting evaluation and collation of segments of the total material would be a valuable, and perhaps profitable, service in a free market. No journal can be justified which is not used fairly fully by a majority of its subscribers, very different from present practice.

f. Review journals and free enterprise

Relieved of the unnatural responsibility for primary archives and communication, the societies and other journal sponsors can still perform services of outstanding importance, especially in review and interpretation. In this area authors and editors may deserve royalties for incentive and reward and the free enterprise arguments are

generally most valid. But there will now be a fair market for subscribers' choices without the coercion now implicit in the need for access to the primary literature. So there will not be the inordinate pressure for scattering and increase in journals, only what the market wants and can actually afford.

g. Abstracts

The preparation of analytical abstracts of the SCITEL repository may not be advisable since manpower requirements probably limit the marginal adequacy of present services. Authors will be encouraged to submit their own abstracts as aids in the scanning of their articles in the SCITEL Daily. Peripheral agencies will continue their abstracting services insofar as their added value competes with the services already offered by the SCITEL system. Hanging abstracts (without documentary antecedents available to the reader) have no place in scientific communication and should be actively discouraged, e.g. by the convention of ignoring them in the retrieval system. Societies will of course have the option of disseminating abstracts in connection with symposia and meetings, but they should refer to papers that have already been submitted to the depository. The SCITEL Daily facility might well serve society requirements for special numbers constituting the responsible papers.

Economics

The allocation of cost is part of the switching mechanism and should be considered further in relation to the government's acceptance of primary responsibilities and the flow of information and the calculated cost figures. The actual cost of a centralized mechanism must be considerably lower than the present journal system counting only the savings in efforts of editors and librarians and the economics of large volume printing. Its impact on scientific efficiency should be the main consideration. These savings may already counterbalance the wastage involved in sending more newsprint to every scientist than he can likely read in detail.

The surviving journals need special consideration. Subscribers should continue to use their grant funds to support the subscriptions--this establishes the most constructive market to evaluate the utility of a journal or rather the journal's service. The page charge subsidy inevitably leads to pernicious bias to authors' rather than readers' needs and should be interdicted as should most direct subsidies of non-SCITEL journals as soon as rationalized channels of primary publication are set up. A limited number of review journals may be subsidized as a means of inculcating further interest in some special fields as dictated by findings of specific national interest much as other agencies and industries will undoubtedly do as well.

SCITEL looks to the future development of data handling and telecommunication systems to replace the techniques of the present proposal. Research and development of advanced techniques should be among its direct responsibilities, and can best be furthered in direct connection with the services being improved.

Impact

The SCITEL system should eventually be extended to all fields of science and will have a spontaneous impetus to do so if the initial experiment is successful in its services. The SCITEL Daily would then retain a general section as a major point of intercommunication among scientific fields and one or more special sections addressed to the major interests of the recipient. The government must assume primary responsibility for such a centralized system but would be foolish to overlook the special capabilities, experience, zeal and organization of existing groups to undertake important parts of the system work under central guidance and contract support. The effective use of their capabilities should answer the complaint of some government agencies that they are unable to offer better services for lack of competent technical people.

