Examples are: vendor catalog files, Government reports, and other materials.

Future of Microforms and Technical Information. Although not done at the present time due to the lack of microfiche duplicating facilities and the availability of reader or reader-printer units at various locations, we are approaching the "D" (for Duplicating) library proposed by Heilprin several years ago.[2] With this system, copies of the requested material would be duplicated in microform by the information store and given to the requester with instructions that it should *not* be returned.

Many present-day design engineers, notably in the Bell Telephone Laboratories,[3] consider an aperture card reader for viewing engineering drawings as important as the desk telephone. The technical scientist or engineer in the near future will require a personal, desk-type microform viewer with hard copy printout capability located nearby. Savings possible in technical information distribution costs and technical time will easily justify this equipment.

Microforms are receiving increased usage, but not because people actually prefer them. Studies indicate that most users still prefer paper documents. The fantastic proliferation of published information, which greatly exceeds the actual development of new information many times over because of the multiplicity of publishing efforts, has made it impractical and uneconomical to attempt to store the necessary part of the collection in paper form, particularly at several locations. Microforms are currently providing us with a more efficient and economical method for handling technical information.

However, this use of microforms for the distribution of technical information is just another interim step in the information continuum. The battle to improve technology for information storage techniques continues. In the not-too-distant future, the larger central information store will be perfected. It may use holographic techniques for high-density storage in crystal-type materials. This will eliminate the need for many satellite information storage files. The user will key-in the desired document number from his remote location, and input-output equipment coupled with possibly a laser-type, high-speed transmission facility will give him the option of viewing the information on a screen or receiving either a microform or paper copy. The technology is here. It is only a matter of lowering costs to a justifiable level.

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Current Information Dissemination: Ideas and Practices*

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A detailed description and a tabulated summary of the salient features of 17 current awareness information services are presented to illustrate various approaches to handling the current information dissemination problem.

The American Institute of Physics, a federation of the seven leading American societies in physics and astronomy, is the single largest publisher of physics in the world today. It produces about 85% of the physics journal material published in the U.S. and, with its translation program, about 35% of the world's total physics journal output. Although an information program has been in existence since 1958, it has recently been reorganized and expanded. The new Information Division now has the responsibility for conducting studies that will lead to the design of a national physics information system. This program is being supported by the National Science Foundation as part of its effort to promote the development of discipline-oriented information systems.

The current work and plans of the AIP's Information

Division emphasize the following interrelated areas: intellectual organization of physics information; computer-based photocomposition; creation and maintenance of a computer store of physics literature; and dissemination of information. The study, whose findings are reported below, is part of this last activity. A detailed description of 17 awareness systems for current literature is presented together with a comparison table (Table I) from which similarities and differences can be noted. In undertaking this study, AIP intended to determine the range of products and services available outside of physics for the dissemination of current research developments.

Several criteria were applied in selecting the services for inclusion. Because of AIP's role as publisher, an examination of the current publishing scene was of paramount importance. All indications are that publishers, regardless of whether or not they are producers of primary

or of secondary publications, are quite concerned with improving the usefulness and timeliness of their products. The introduction of new alerting services, as part of their regular services, their experimentation with new types of products, such as computerized journals, their preoccupation with preprint (unrefereed) and offprint (refereed) distribution all point to this concern.

In addition to studying the role of other professional societies, such as the American Chemical Society, the Institute of Electrical and Electronics Engineers, and the American Mathematical Society, in current information dissemination, it was considered important to look at alerting services offered by nonprofit information services (Engineering Index, Chemical Abstracts Service), commercial information services (Institute for Scientific Information, Pandex), educational (State University of New York at Buffalo), industrial (B. F. Goodrich, North American Rockwell), and various governmental agencies. And, as AIP's plans definitely include the eventual operation of information services, there was particular interest in examining experimental, operational, and defunct services.

The form of material supplied such as preprint, bibliography, and offprint, its medium, such as hard copy, microcopy and digital recordings, and the form of recipient selection, such as by subscription or according to interest profiles, were all important considerations in examining a service.

In describing each service special, an effort was made to obtain cost figures. It must be noted, however, that depending on the service discussed, the figures quoted vary between the price to the individual and the cost to the organization offering the service. Unfortunately, a breakdown of costs—i.e., overhead, computer time, training time, etc.—was seldom available.

There is a growing tendency among different types of organizations to undertake joint experiments. The one between the Chemical Abstracts Service and 24 educational, industrial, and governmental organizations is a good example. Their goal is to determine how effectively a "wholesaler" can supply information to "retailers" for internal selective dissemination. This concept of wholesale vs. retail supplying is of particular interest to information service producers and distributors. The problem centers on an economic decision as to the advantages and disadvantages of serving individuals vs. organizations or both. NASA's experimentation with group SDI is but one approach to controlling costs.

SYSTEM SUMMARIES

The following is a complete list of systems studied and discussed:

a.	American Chemical Society	I&EC - "Research Results" service
b.	American Mathematical Society	"Mathematical Offprint Service"
c.	American Psychological Association	"Manuscripts Accepted for Publication" service, available in five journals
d.	B. F. Goodrich Co.	"Automatic Information Distribution" service
e.	Biochimica et Biophysica Acta	Previews
f.	Bonneville Power Administration	SDI
g.	Chemical Abstracts Service	"Experiment in SDI"
h.	Engineering Index, Inc.	User Participation SDI Program
i.	Institute for Scientific Information	"ASCA III"
j.	Institute of Electrical and Electronics Engineers	Computer Group News - "Repository"
k.	Institution of Electrical Engineers, London	SDI
l.	National Aeronautics and Space Administration	SDI SCAN
m.	National Cancer Institute	SDI
n.	National Institutes of Health	"Information Exchange Groups"
o.	North American Rockwell Co.	SDI
p.	Pandex	SDI
q.	Technical Information Dissemination Bureau, State University of New York at Buffalo	"Current Awareness"

American Chemical Society,[16] Washington, D. C. *Industrial and Engineering Chemistry*, "Research Results."

CURRENT STATUS. Operational. Frequency of service: monthly

FREQUENCY OF PUBLICATION. Monthly. "Research Results" has been a regular feature of the journal since 1965. It was started on an experimental basis in 1962.

PURPOSE. To announce papers that have been submitted and are under consideration for publication by *Industrial and Engineering Chemistry* or one of its associated quarterlies—i.e., *Fundamentals*, *Product Research and Development*, and *Process Design and Development*. Thus, this service is a vehicle for rapid dissemination of information with the exclusion of refereeing and indexing. It is estimated that the four journals process about 600 papers per year.

DESCRIPTION. The following information is provided for each item: author(s), institutional affiliation, title, short summary of paper prepared by I&EC staff, number of pages and figures, price, and code number that includes year identification. An average of 30 papers are listed in each issue, out of an average of 45 received. The difference between those listed and those received is attributed to three factors.

> 1. Immediate reject, without further refereeing, by the editor.
> 2. Rapid acceptance, so that there is no incentive to list item in the service.
> 3. Refusal of author to have his paper listed.

Thus, the over-all listing rate is two out of three. It is estimated that 85% of all items listed are eventually published. Manuscripts remain in the active store until accepted or until they are withdrawn by the author. Either of these will take place on the average of between 4 and 8 months after the item appears in "Research Results."

DISTRIBUTION. Individual orders to ACS headquarters. ACS offers processing within 24 hours of receipt with shipment by first-class mail. The cost is $1.00 for each 10 pages for subscribers and $2.00 for nonsubscribers. On the average 250 orders per month are filled for approximately 300 manuscripts. This indicates an average sale of 10 copies per item and has remained substantially constant since the initiation of the service. The time lag

between receipt of the paper and the announcement of its availability ranges from two to eight weeks, averaging about a month. The time lag between announcement and publication of a paper, if accepted, ranges between 4 and 10 months. Purchasers are asked to treat manuscripts as private communications and to cite them only if the author consents.

COMMENTS. As already mentioned, no manuscript is announced without the author's authorization, thus making the service an author-controlled enterprise. It was learned that the present price structure does not pay for the cost of the operation, and the ACS has absorbed the deficit owing to the service's generally acknowledged acceptance and success in the chemical engineering community. No study has been conducted to determine the relationship, if any, between price and extent of use of the system. Problems pertaining to priorities, patents, copyright, etc. have not been encountered.

American Mathematical Society,[2] Providence, R. I. Mathematical Offprint Service (MOS).

CURRENT STATUS. Advanced planning stage; expected to be operational in mid-1968. Frequency of service will be monthly.

DATA INPUT. Approximately 60 journals selected from the list of highest priority journals reviewed in *Mathematical Reviews*. (Bibliographic and indexing data only.)

INDEXING. A classification scheme developed especially for the new service. Copies will be available to subscribers in English, French, German, Italian, or Russian. While initial operations will be performed by indexers of AMS, it is anticipated that classification eventually will be done by authors and/or editors and referees of the participating journals.

USER POPULATION. Presently, there are approximately 600 subscribers. This number is expected to reach 2000 by the end of the first year of operation.

USER PROFILING. The following parameters will be available to the subscriber for indicating his interests.

1. Subject. Using the MOS classification scheme, the subscriber will indicate his primary and secondary fields of interest.
2. Author. Identification of those whose articles are desired and those whose articles are *not* desired.
3. Journal. Any one of the 60 participating journals and additional ones as they became available.
4. Language. Identification of those that are not acceptable from the choice of English, French, German, Italian, Rumanian, Russian, and Spanish.
5. Special Interests. The subscriber may, if he wishes, make exceptions and additions to the general selection rules. This will be accomplished by formulating Boolean equations.

Users may adjust profiles at any time.

DOCUMENT/PROFILE MATCHING. Matching is based on the presence and/or absence of the above outlined four parameters in the interest profile. The presence of either one of two parameters—i.e., specified authors and primary subject interests—automatically ensures receipt of an offprint. Combination of the others results in only a bibliography. In each bibliography listing the reason for inclusion is indicated. For example, author not wanted, language not wanted. A specification by means of a Boolean statement overrides any other specifications on the form.

USER NOTIFICATION AND RESPONSE FORM. A two-part computer-generated statement that consists of:

1. Title listings of the offprints enclosed with the statement as well as titles of articles in which subscriber has indicated secondary interest.
2. Evaluation sheet; general comments are acceptable.

EQUIPMENT. Input: Dura 1401; processing: Honeywell H200.

COST. 100 offprints for $30—title listings equal one offprint. For an additional $0.03 per offprint a subscriber may be notified of offprints selected and ordered each month. Offprints can not be purchased separately from the AMS.

COMMENTS. It seems that the project will become operational without going through a pilot stage. Also, it seems that the membership was not surveyed on their need or desire for such a service prior to the decision by the Committee to Monitor Problems in Communication in the Mathematical Sciences to institute same. The stated purpose of the new service is "to provide a single source of current information for the research mathematician and to add a new dimension to mathematics publishing." Mathematical Offprints Service will be supported by a grant from the National Science Foundation.

American Psychological Association,[3] Washington, D. C. "Manuscripts Accepted for Publication" service. Service is available in the following five journals as a regular feature:

Journal of Applied Psychology, bimonthly
Journal of Consulting Psychology, bimonthly
Journal of Counseling Psychology, bimonthly
Journal of Experimental Psychology, monthly
Journal of Personality and Social Psychology, monthly

DESCRIPTION. Listing is in order of acceptance, although no dates are given. Number of items announced varies. It is stated that those on the top of the list will appear in the next issue and the others will be distributed in the issues over a six-month period. The following information is included for each item: title, author, organizational affiliation, and address.

PURPOSE. This listing is one of the innovations resulting from the APA's "Study of Scientific Information Activities." It represents the backlog of accepted manuscripts and was instituted "to allow readers to become aware of research many months in advance of journal publication." Owing to a printing backlog, there is a two to three months' delay from time of acceptance till time of appearance in the listing. Although the project started as a one-year experiment in 1965, it is still operational and is still being evaluated.

DISTRIBUTION. Direct contact between requestor and author, with the exclusion of the APA. Basically, the operation is an informal author-controlled preprint exchange on a greatly enlarged scale. There is no indication of any financial assistance to the authors from the APA.

STATISTICS. There was a partial evaluation of the experiment between January and August 1965. Data were collected by means of questionnaires from both requestors and authors. The 603 authors who responded received over 2,500 requests for information; 9 out of 10 authors received requests for preprints. The requestors appeared mainly to be young researchers who would not have access to the "invisible college." Although most of the authors

Table I. Comparison of 17 Current Awareness Information Services

Systems	Current Status /Frequency	Documentation Input	Vocabulary Control	Profiling Method	Audience/ Profiles	Profile/ Document Matching	Match Notice/ Distribution	User Feedback	Equipment	Cost
a. American Chemical Society "I&EC Research Results" Service[a]	operational; monthly	bibliographic identification and abstracts of manuscripts that are under consideration for publication	...	...	general readership		individual orders to ACS headquarters	number of orders indicates that operation is very successful		$1.00 for each 10 pages for subscribers double for nonsubscribers
b. American Mathematical Society "Mathematical Offprint Service"[22]	advanced planning; will be operational mid-1968; monthly	60 high priority journals; bibliographic and indexing data	special classification scheme	five parameters can be specified: subject, author, journal, language, special interests	600 subscribers	manipulation based on presence and/or absence of four specific parameters; Boolean logic	printout of title listings. Offprints added when match indicates	separate computer printed evaluation sheet	Input: Dura 1401; Processing: Honeywell H200	$30 for 100 offprints. Ten title listings equal one offprint
c. American Psychological Association "Manuscripts Accepted for Publication" service, available in five journals[1]	operational; frequency of journals varies between bimonthly and monthly	bibliographic identification of manuscripts accepted for publication	...	...	general readership	...	direct contact between requestor and author	...	...	...
d. B.F. Goodrich Co. "Automatic Information Distribution Program"[?]	advanced planning	internal documents and open literature	internal thesaurus	keywords using thesaurus	in-house community; size and composition not specified	modified weighting	printout of matching terms sum of weight factors	...	GE 235 16K storage 8 tape drives	$3.00 per year for subscription
e. Biochimica et Biophysica Acta. Previews[21]	defunct as of December 1967; was monthly	bibliographic identification and summaries of manuscripts accepted for publication	...	...	subscribers	...	free to subscribers of BBA or separate subscription	small number of separate subscriptions indicated little need for service	...	...
f. Bonneville Power Administration SDI Service[?]	operational; weekly	abstracts from open literature	natural language	descriptors	68 group representatives, 386 profiles	"weighting or point-count scheme"	user i.d., bibliographic entry, abstract, hit levels, matching terms, weights	punch out feature on response card	IBM 1401	total weekly preparation cost: $350.00
g. Chemical Abstracts Service Experiment in SDI[?]	experimental; biweekly	abstracts from 32 journals	keywords	keywords using CAS Search Guide	24 organizations	straight word matching, term Truncation, and weighting	10 copies of SDI abstracts and 1 SDI file on tape for each participant	...	IBM 1401 or IBM 360/ 40 or 50	$8000-maximum per participant per year plus blank tape
h. Engineering Index[?] 1. User Participation Program 1968; 2. SDI Service	1. experimental; monthly 2. developmental; monthly	350 journals, 500 articles per month in plastics; 360 journals, 1000 articles per month in electrical/electronics	EI thesaurus	keywords using thesaurus	1. 12 organizations 2. 5 project leaders at each of two cooperating companies	Boolean logic	2. author, title citation and index terms	2. evaluation of relevancy of material on three parameters	IBM 1401 IBM 360/30 or 40	1. depending on level and subject field price varies between $1400 and $2000 per year
i. Institute for Scientific Information "ASCA III"[?]	operational; weekly	1850 journals	note. use of such parameters as citation and title indexing	6 parameters can be specified: word, author, organization, journal, cited reference, cited author	individual and organizational subscribers	Boolean logic	printout contains: customer i.d., weekly no. of items processed, bibliographic i.d. of hits and parameter causing match	profile changes are solicited twice in a subscription period; they can be submitted weekly	IBM 360/30	minimum of $100.00 per year

Service	Status; Frequency	Coverage	Vocabulary	Indexing terms	Users	Search method	Output form	Evaluation	Equipment	Cost
j. Institute of Electrical and Electronics Engineers "Computer Group News: Repository"	experimental; bimonthly	bibliographic identification and abstracts of manuscripts under consideration for publication	...	...	general readership	...	individual orders to IEEE headquarters	...	...	$1.00 plus 5¢ per page per paper
k. Institution of Electrical Engineers, London SDI Service	experimental; weekly	English language periodical literature	thesaurus of Electrical and Electronics Abstracts	descriptors	600 participants of which 540 are individuals, 60 are small groups	modified Boolean logic and exact match	bibliographic entry and index terms	evaluation of relevancy of material on three parameters	ICT 1901	free of charge
l. National Aeronautics and Space Administration 1. SDI 2. SCAN (Selected Current Aerospace Notices)	1. operational; weekly 2. developmental; weekly	material covered in *Scientific and Technical Aerospace Reports* (STAR) and in *International Aerospace Abstracts* (IAA)	NASA *Thesaurus*	1. developed by analyst, using controlled language, based on a written statement 2. subject topics	1. approximately 600 individuals at 12 NASA sights 2. representative NASA research centers and contractors	weighting	1. 8½ × 11 size computer printout; it contains bibliographic identification, index terms, and NASA accession number 2. continuous listing under topics	1. notice contains 3 response blocks: of interest, of no interest, document requested; 2. none	IBM 1410 being converted to IBM 360/40	...
m. National Cancer Institute SDI Service	evaluative; was semimonthly	bibliographic and indexing data for 1389 articles from 12 journals	special hierarchical decimal classification system	category numbers	103 geographically scattered participants	exact match	computer printed mailing labels, manual sorting and reproduction of title pages of matching articles	evaluation is done on three parameters using one of four rating levels for each	IBM 360/50 and Xerox 914 or 2400	20¢ total for each item mailed
n. National Institutes of Health Information Exchange Group	defunct; was experimental and irregularly issued	personal communications, called memoranda	...	...	3663 geographically scattered participants	...	centrally handled through NIH by direct mailing	...	...	$115.00 per year per man served
o. North American Rockwell Corporation Aerospace and Systems Group SDI Service	operational; monthly	all report literature, exclusive of those catalogued by DDC or NASA	internal thesaurus	descriptors using thesaurus; also limiting parameters, such as author, contract number, etc.	15,500 on a group wide basis	weighting	printout containing bibliographic data, abstract, and descriptors	evaluation of relevancy of material	IBM 360/30 and 50	preparation cost; 37¢ per profile plus 10¢ per notice
p. Pandex SDI Service	operational; weekly	2100 journals, 7000 books, technical reports and patents	internal thesaurus	descriptors	individual or institutional subscribers	weighting	either: weekly tape service or computer generated individual two part cards	...	IBM 360/40	$6500.00 per year for tape service, $150.00 per year for individual service
q. Technical Information Dissemination Bureau/State University of New York at Buffalo "Current Awareness" Service	operational; biweekly	source index tapes (by ISI) Pandex tapes, 300 journals, and reports	natural language	developed either by user or by information specialist based on a written statement from user	100 health sciences faculty, 30 engineering faculty, 10 TIDB staff members, 60 scientists and engineers from industry	Boolean logic, term weights, complete negation by negative terms	computer generated two-part card	regular objective sampling of participants' notifications; solicited, subjective, evaluation periodically	IBM 360/40, 5 disks, 256K core	$225.00 per participant per year

were known for previous work in the same area, only 1/8 of the requestors had known of the authors' continuing research before the listing. Some 8% of the authors became acquainted with work of high interest to them and 15% of the requestors modified current work as a result of contact with the authors.

B. F. Goodrich Co.,[5,17] Research Center, Brecksville, Ohio. Automatic Information Distribution Program. The "automatic information distribution" program, as it is called, will be an integral part of the total information retrieval system using a common data input. Identical processing techniques can be used for both retrospective searching and for SDI. The system has features similar to those in IBM's SDI-4 and 5.

CURRENT STATUS. Advanced planning.

DATA INPUT. The system can accommodate both the open literature and internal documents. The information is stored on magnetic tape, arranged in dual dictionary form.

INDEXING. Internal thesaurus. The style is similar to the AIChE thesaurus.

USER POPULATION. Size and composition not specified.

USER PROFILE. Standard profiling forms will be used that contain all allowable choices. The participant assigns weights to the terms that are of interest to him. Profiles can be adjusted each time a run is made. As a by-product of the profiles a "who-knows-what" file can be produced by combining the profiles and inverting the collection. This file is a list of profile terms containing names of persons who are interested in these terms. This idea assumes, of course, that expressed interest in an area implies expertise.

PROFILE/DOCUMENT MATCHING. Modified weighting technique.

USER NOTIFICATION. The computer printout includes document number matching terms and sum of weight factors. Bibliographic data for the documents can be added. It is interesting to note that the distribution list for individual document routing is also stored in the computer. If during the profile processing a hit is scored, the computer automatically checks whether the participant's name is on the distribution list for that document. If so, he will not be notified of the hit. It is assumed that he will see the document.

EQUIPMENT. GE 235. 16K storage, 8 tape drives.

COSTS. Unknown (not yet in operation).

COMMENTS. None.

Biochimica et Biophysica Acta-Previews.[23] Publisher, Elsevier Publishing Company.

CURRENT STATUS. Defunct, as of December 1967.

FREQUENCY OF PUBLICATIONS. Monthly, it was started in 1961.

PURPOSE. To supplement *Biochimica et Biophysica Acta* by giving advance information about forthcoming full-length papers in the form of summaries and titles of *Short Communications and Preliminary Notes.*

DESCRIPTION. As soon as an article had been accepted for publication in *BBA*, its author's name and address and the summary were retyped, adding the *BBA* number, in camera-ready form and offset monthly. The time lag between receipt of a paper and its announcement in the *Previews* was about two months. No reprints of the printed summaries could be ordered. Pages of the *Previews* were

not numbered to avoid duplication of bibliographical data caused by literature references made to *Previews.*

DISTRIBUTION. Free to subscribers of *BBA* or separate subscription for $3.00 per year.

COMMENTS. According to Dr. J. F. Remarque, editor-in-chief of Elsevier's biomedical division, the decision to stop publishing the *Previews* was made because the delay from receipt of manuscript to its publication in *BBA* was brought down to three to five months. In some cases, the *Previews* reached readers *after* the full paper appeared in the main journal. Also, the number of separate subscribers to the satellite journal was very low. As of February 1968, no complaints have been received by the publisher due to discontinuation of the journal.

Bonneville Power Adminstration,[7] Portland, Ore., SDI Service.

CURRENT STATUS. Operational since 1965. Frequency of service, weekly.

DATA INPUT. Author abstracts derived from the open literature in the area of electric power transmission. The following are input data characteristics:

Abstracts	
Documents input per week	120
Average words per abstract	70
Average characters per abstract	450
Average cards per abstract	12
Average cards input per week	1500

INDEXING. None, as natural language retrieval is used.

USER POPULATION–USER PROFILES. Although there are officially only 68 individuals enrolled, each one of these represents a small group working in a specialized area. It was preferred that only one member receive and screen the notices for the group. Profiles are constructed in a joint effort by the librarian and the user. Descriptors are chosen for high specificity; all synonyms for a word are included. The following are profile data characteristics:

Profiles	
Number of engineers enrolled	68
Number of profiles	386
Average number of profiles per engineer	5.7
Minimum number of profiles per engineer	1
Maximum number of profiles per engineer	25
Average number of descriptors per profile	15
Minimum number of descriptors per profile	2
Maximum number of descriptors per profile	50

PROFILE DOCUMENT MATCHING. "A weighting or point-count scheme" is used; weights range from −9 to +9.

USER NOTIFICATION AND RESPONSE FORM. A two-part printout is used. The notice contains user identification, complete bibliographic information, abstract, hit levels, matching terms, and weights.

Notices printed per week	1400
Notices per week, returned by users	875

As an improvement, the bibliographic information is also printed on the response form. This is a time-saving device for quick document location. Better than 65% relevance measures have been reported. Also, an acknowledged change of reading habits of many of the participants has been observed.

EQUIPMENT. IBM 1401-CR-01X system modified. 8K core storage; 5 magnetic tape units.

COSTS. Figures below were based on a week when there were 115 abstracts and 1128 output notices:

Processing Statistics	Hours	Cost
Card punching @ $4.50 per hour (no verification)	33	$148
Current-awareness processing		
a) Edit	0.20	
b) Multiple keywording	3.16	
c) Match and print	2.58	
Total (all programs)	5.94	
Accumulation of data base for eventual retrospective search (single keywording, and merging and associated programs)		
Total weekly processing (IBM 1401 @ $30 per hour)	6.74	202
Total costs per week		$350

IMPLEMENTATION COSTS. Incidental to the adaptation of the IBM system, considerable effort was devoted to the training of equipment operators, input/output control personnel, and library staff. This need increased the initial costs considerably. A summary of costs is shown below. They apply to the 9-month implementation period.

DEVELOPMENT, TRAINING, AND TESTING COSTS

1401—250 hours	$ 5,200
Keypunching—44,000 cards	2,800
ADP Analysis & Programming—840 hours	8,000
Total Costs	$16,000

COMMENTS. The operator feels that flexibility is the outstanding feature of the system mainly because it is capable of operating either with or without a thesaurus.

Chemical Abstracts Service,[9,26] Columbus, Ohio. Experiment in SDI.

CURRENT STATUS. Experimental; will end June 21, 1968. Frequency of service, biweekly.

DATA INPUT. 32 journals abstracted on a "take-all" basis—i.e., all primary articles, totalling approximately 17,500 abstracts for the experiment, each with an average length of 170 words.

INDEXING. Keywords are selected from the abstract by the editor.

USER POPULATION. 24 educational, governmental, and industrial organizations and their employees.

USER PROFILES. They were prepared by participant's technical libraries or information centers for their staff using key-words. A newly compiled thesaurus, called "The CAS Search Guide" was supplied to participants to aid them in profile preparation.

PROFILE/DOCUMENT MATCHING. Straight word matching, term truncation, and weighting are recommended techniques.

USER NOTIFICATION. Each participant received:

1. 10 copies of SDI abstracts biweekly.
2. 1 SDI file on magnetic tape biweekly.
3. List of journal issues covered biweekly.
4. Complete computer programs and flow charts for either IBM 1401 or for IBM 360/40 or 50.

Arrangements could be made for:

1. Receipt of duplication mat of printed issue.
2. Search of tape at CAS at cost.

EQUIPMENT. IBM 1401 or IBM 360/40 or 50.

COST. $8000 maximum per participant for the experiment. In addition, participant furnished blank magnetic tapes.

COMMENTS. A report evaluating the experiment will be prepared. After conclusion of the experiment CAS will offer *Basic Journal Abstracts (BJA)* as a continuing service to subscribers. Journal coverage will be the same as for the experiment. *BJA* is a combined tape and published bi-weekly service. Subscription price is $4000 per year. Chemical Abstracts Service feels that their role in SDI is to supply a data base to users. This data base will be in machine readable form but the form of the output, after manipulating or searching the data base, may be varied to suit the user's needs.

Engineering Index, Inc.,[29,30] New York. User Participation Program for 1968 and SDI. The User Participation Program is a tape-lease lease service that was initiated in 1968 to extend the evaluation of the input and output of a continuing development effort of machine systems, application in current awareness, and selective dissemination. The following products and services are offered to interested organizations: a master file on tape, containing citation, indexing, and subject heading information in the fields of Plastics and Electrical/Electronics Engineering; term control via a thesaurus on tape; software capability for searching; and a user's guide. These services are available in three levels depending on the subscriber's in-house capabilities:

Level I is designed for users with in-house processing capabilities, using their own software.

Level II is designed for users with in-house processing capabilities on equipment compatible with EI's and using EI's software for searching.

Level III is designed for users with in-house processing capabilities on equipment compatible with EI's and who wish to coordinate files of their internal reports with the EI files.

A developmental SDI service, supplied to the Diamond Shamrock Company and to Dow Chemical Company in the field of Plastics Engineering only, operates from Engineering Index and is considered as *Level IV* of UPP.

CURRENT STATUS. 1. UPP: pilot; 2. SDI: developmental. Both are monthly services.

DATA INPUT. The plastics file covers about 350 journals adding about 500 articles per month. The Electrical/Electronics file covers about 360 journals totalling about 1000 articles per month. The plastics file is also available in printed form (*The Plastics Bulletin*) and contains abstracts for each item also.

INDEXING. A specially developed EI thesaurus that contains synonym and hierarchical relations.

USER POPULATION. 1. UPP: 12 organizations with all levels and both disciplines represented. 2. SDI: five project leaders at each of the two companies.

USER PROFILES. In the UPP, clients prepare and maintain their own profiles using the EI thesaurus. In the SDI program, individual participants and library or information center staff of each respective company prepare the profiles jointly, using the EI thesaurus. The library or information center is the interface between EI and individual clients.

PROFILE/DOCUMENT MATCHING. Boolean logic.

SDI USER NOTIFICATION AND RESPONSE FORM. EI sup-

plies the library or information center of each cooperating company with two copies of computer printout of lists for each profile; one copy is for the library and the other is distributed to the participants. Each notice contains author, title, citation, and index terms. In addition, participants receive a summary report of hits, a search input record, and a deck of 3 × 5 cards containing abstracts of each article covered that month. Advantage of abstract cards: they arrive 3 to 4 weeks before the printed *Plastics Bulletin* does. The participant evaluates the relevancy of the material using three parameters: high interest, limited interest, low interest.

EQUIPMENT. Either IBM 1401 or IBM 360/30 or 40. UPP *Level I* users employ any equipment.

COST. UPP.

Level I

Plastics File	$1400 per year
Electrical/Electronics File	$1600 per year

Level II

Plastics File	$1600 per year
Electrical/Electronics File	$1800 per year

Level III

Plastics File	$1800 per year
Electrical/Electronics File	$2000 per year

COMMENTS. The purpose of the User Participation Program is said to be two-fold:

1. To obtain feedback concerning the intellectual input of the data base.
2. To obtain experience in system marketing as well as program and service administration.

It is mainly the lack of adequate in-house personnel that prevents EI from further extending its direct SDI services.

Institute for Scientific Information,[13, 14] Philadelphia, Pennsylvania. ASCA III (Automatic Subject Citation Alert).

CURRENT STATUS. Operational. Frequency of service, weekly.

DATA INPUT. Approximately 1850 scientific and technical journals and patents.

INDEXING. No controlled vocabulary; use of such parameters as citation and title indexing.

USER POPULATION. Individual and organizational subscribers.

USER PROFILING. Subscribers can specify the following parameters for indicating their interests:

1. Words: can be a single word, word stem, string of words.
2. Cited reference: can be book, article, paper, report or patent number.
3. Cited author.
4. Source author.
5. Organization.
6. Source journal, cited journal.
7. Combination: all the above can be used alone or in any combination with each other.

Profile changes can be submitted at any time.

DOCUMENT/PROFILE MATCHING. Boolean logic.

USER NOTIFICATION AND RESPONSE FORM. A computer generated statement that contains customer identification, including account number and balance, weekly number of items processed for the search, bibliographic identification of hits, and identification of search parameter causing match.

EQUIPMENT. IBM 360/30.

COST. The basic yearly subscription rate is $100 in the U.S., Canada, and Mexico. However, the total cost depends on the type and number of profile parameters specified. For example, the fee for specified words varies between $4.00 and $6.00 per word per year, depending on whether or not they are used alone or in combination. Also, there is a separate "High Frequency Term Price List." The price for the organizational parameter is $10.00 per year. The number of hits scored does not affect the cost.

COMMENTS. None.

Institute of Electrical and Electronics Engineers,[21] Computer Group, New York, New York. Computer Group News, "Computer Group Repository."

FREQUENCY OF PUBLICATION. Bimonthly—the Repository is a regular feature of the journal.

PURPOSE. To announce papers that have been submitted and are under consideration for publication. In the November 1967 issue, 15 items were included.

DESCRIPTION. The following information is provided for each item: code number, author(s), title, date of receipt, length, price, author abstract. As this listing is a vehicle for rapid dissemination of information, manuscripts are neither refereed nor indexed by the IEEE. Although some of the papers might be published later, presently there are no statistics available about the percentage of them that find their way to the open literature.

DISTRIBUTION. Individual orders to IEEE headquarters. The *cost* is $1.00 plus 5¢ a page per paper. Although there is no indication that the service is limited to membership only on the order blank, requestors are asked to supply their membership number. On the average 100 orders are filled monthly. Total requests for a given paper range from 2 to 20. The time lag between the announcement of an item and the mailing of a purchased copy to the subscriber varies from 2½ to 4½ months.

COMMENTS. The project is considered strictly experimental by the IEEE. The repository was organized in July 1966 and presently contains 238 papers. The publications advisory board approved the experiment with reluctance, relying mainly on the judgment of "News" editor-in-chief, Professor H. D. Huskey. He believes in the importance of the project. The following are the already visible problems:

1. Although the listing is unofficial as far as the IEEE is concerned, citations to this material have already been encountered.
2. Question of priorities and copyright, in case a manuscript has not been accepted, can arise.
3. No date has been set yet for weeding the store, and no mechanism has been instituted for identifying those manuscripts that become available in the open literature.

This is presently a small manual operation. Other divisions of the IEEE have not shown interest in organizing similar undertakings.

Institution of Electrical Engineers,[11, 18, 22] London, England, SDI Service. This SDI system is still in the pilot stage. It was originated and carried through the first two phases of activities by the National Electronics Research Council starting in 1965. Phases 3-6, that constitute present

activities, are aimed at the operation of a medium size system and to establish "whether participation in an SDI system will produce a measurable change in information gathering habits and in the general approach to information." It is anticipated that the system will be operational in 1969.

CURRENT STATUS. Experimental.

DATA INPUT. English language periodical articles (including cover-to-cover translations of foreign language periodicals) supplied by the Science Abstracts organization. Documents input per week, 240.

INDEXING. To ensure compatibility with IEEE activities, the revised thesaurus of Electrical and Electronics Abstracts is used.

USER POPULATION. Total of 600 participants, of which 540 are individual researchers and 60 are small organizations, departments, or sections, treated as single units. The 600 are evenly divided among government, industry, and educational institutions.

USER PROFILES. Participants describe their subject interest in their own words which in turn are translated by the staff into descriptors used in the system. The staff also suggests associated terms and additional concepts, and returns a proposed profile to participants for comments and changes. Provision for profile change on request is built into the system.

PROFILE/DOCUMENT MATCHING. Three types.

    a) Simple matching on a number of descriptors.
    b) Matching of a number of descriptors, where one or more are specified as essential.
    c) Variation on Boolean logic.

Whether high recall or high relevance is preferred is expected to be learned during the operation.

USER NOTIFICATION AND RESPONSE FORM. The weekly notification form contains bibliographic information and the list of descriptors used to index the article. The response card contains three options to designate usefulness of an item. Studies will be conducted to determine the value of including abstracts on the notification card. Every 8th week, notification cards are substituted with a printed bulletin comprising a complete listing, under broad subject headings, of all the items added to the system the previous week. Individual participants get those sections only that are likely to contain material of interest to them. They mark items that they consider essential and send the listing back. By comparing this returned listing with the notifications that would have been sent, statistics concerning recall are obtained.

EQUIPMENT. ICT 1901.

COSTS. Free of charge.

COMMENTS. Although the announced intent of the project is to test the value, usefulness, and acceptability of the SDI service, studies are also being conducted to test the efficiency of the system for retrospective searching. Participants are provided with the service free of charge but, in return, they are expected to provide assessments of the service and other information that may be required.

National Aeronautics & Space Administration,[6, 27] College Park, Maryland. SDI; SCAN. The SDI service offered by the NASA Facility can be regarded as a subset of their retrospective search capability, as fundamentally it represents a set of modifications to their basic retrieval programs.

CURRENT STATUS. Operational. Frequency, weekly.

DATA INPUT. Material announced in *Scientific and Technical Aerospace Abstracts (STAR)*—i.e., report literature—and in *International Aerospace Abstracts (IAA)*—i.e., open literature.

INDEXING. *NASA Thesaurus.*

USER POPULATION. Approximately 600 individuals at 12 geographically dispersed NASA installations.

USER PROFILES. In the preferred way, they are developed by analysts, based on a written statement prepared by the user.

PROFILE/DOCUMENT MATCHING. Weighting.

USER NOTIFICATION. A computer-printed, three-part, no-carbon $8\frac{1}{2} \times 11$ inch format is used. The user records his evaluation of the notices received, retains the original, and sends the other two copies to his local library. There, one copy is used to fill document requests and the other is sent to the Facility for response evaluation and general statistical purposes. Notifications provide bibliographic identification, indexing, NASA accession number, and evaluation options—i.e., of interest, document requested, no interest. Average relevancy ratios are 70%.

EQUIPMENT. IBM 1410 (being converted to IBM 360/40).

COST. Operating expenses are almost linear, that is, nearly proportional to the users participating, regardless of whether or not computer processing is performed centrally or locally.

COMMENTS. The present system became operational with the February 1966 issues of *STAR/IAA*. The software, form of announcement, and profiles were all redesigned at that time. To create a more flexible and a more economical current awareness system, NASA is currently experimenting with a group SDI service, called SCAN (Selected Current Aerospece Notices). The major difference between the two systems centers around profile preparation. In SCAN, profiles relate to subject categories, rather than to individual interests, and notices are disseminated to groups of individuals whose interests are in the same area. Costs are thus reduced in both computer time—i.e., processing—and in time required for profile preparation.

Both SDI and SCAN systems are in the process of being converted from the IBM 1410 to an IBM 360/40. The new retrieval systems will add many capabilities, including both Boolean and weighted searching strategies, access to all data fields, and complete flexibility in output formats and sorting options.

National Cancer Institute,[24, 25] Bethesda, Maryland. SDI Service.

CURRENT STATUS. Evaluative. It was experimental for 15 months, from January 1967 to March 1968. Expected to be operational sometime in 1969. Frequency of service was semimonthly.

DATA INPUT. Bibliographic and indexing information for 1389 articles from 12 major cancer research journals and Xerox copies of the title page of each article.

INDEXING. An open-ended—i.e., under constant revision—hierarchical decimal classification system, especially designed for accommodating biomedical information, is used. Articles can be assigned an unlimited number of category numbers. As the category numbers represent precoordinated concepts described in natural language,

they can easily be converted to a conventional alphabetical index. The classification can also be used for creating special subject bibliographies as a subject relationship is inherent in the system. The indexing of the 1389 articles yielded the following data:

1. Average number of assigned categories per article: 3.9.
2. Average indexing time per article: 5.4 minutes.

USER POPULATION. 103 geographically separated scientists who are supported by the National Cancer Institute.

USER PROFILES. Profiling procedure is carried out by operators of the SDI system. Category numbers are assigned to individuals on the basis of:

1. Statements made in their research grant application.
2. A subsequent written statement of research interests supplied by participants in response to a questionnaire.

The present average profile size is 19.8 category numbers per individual. Initial profile development time was 25.7 minutes per research grant indexed. (This excludes time required for all subsequent procedures, such as extension and revision.) Profile revisions are made as necessitated by user feedback. Revision can consist of increasing category numbers, increasing specificity by adding more digits to existing category numbers, or deleting categories.

PROFILE/DOCUMENT MATCHING. Matching is on a one-to-one or single-hit basis. If any one category assigned to an article is a subdivision or identical with a profile category it is considered a hit. As matching is simplified both computer and manual searches can be performed. The following data were derived through manual matching: an average of 2.9 minutes per article was needed to match 168 consecutive articles against 1720 profile categories. Typing and checking of punched card input for computerized input takes about *one* minute per article. Computer matching of 583 category numbers for 148 articles against a combined profile tape containing 1925 category numbers took 5.4 minutes of "execute time" to identify and printout 580 matches and mailing labels. This is 2.2 seconds to match one article against a combined profile for 103 users.

USER NOTIFICATION AND RESPONSE FORM. Printout for each article lists individual users who match that article and the two numbers that caused the match. Mailing labels are also automatically produced. Title pages of journal articles containing bibliographic information and the author-prepared abstract or summary were reproduced (with permission of publisher) and mailed. Evaluation covers three parameters: interest, relation to research, and usefulness. Four possible rating levels can be checked for each parameter. This feedback is used to alter the profile categories.

EQUIPMENT. IBM 360/50, Xerox 914 or 2400.

COST. Twenty cents total for each abstract mailed. This includes indexing, manual and computer operations, but excludes profile development and review. It is projected that this cost could be lowered to 10¢ and that for a cost of $100 per year each researcher could be supplied with abstracts of nearly 1000 articles.

COMMENTS. The system combines computer and manual operations. Whereas matching and profile revision are computer processes, distribution of materials is manual and expected to so remain. The current evaluative phase also includes the conversion of the classification to computer storing for easy updating.

National Institutes of Health,[15] Washington, D. C. Information Exchange Group Experiment.

CURRENT STATUS. Defunct. Frequency of service, irregular.

PURPOSE OF EXPERIMENT. To establish a mechanism by which information exchange in a rigidly defined subject area could be accelerated. Active researchers, regardless of their geographical location and status, would obtain solutions to specific problems, saving both time and money. An evaluation of the pros and cons of such a system was also anticipated. Between the years 1961 and 1967, seven groups were established and made operational in the biomedical field. These functioned substantially independently under the leadership of a chairman without reviewers or referees for submitted memoranda.

ROLE OF NIH. Manager, financier, printer, and distributor of *IEG Memoranda*.

DISCUSSION OF PROJECT THROUGH STATISTICS.

Number of Communications Produced: Total of 2561 memoranda, produced by 3663 participants, were distributed in 5 years. Of this, 87% were eventually published in the open literature.

Elimination of Duplication, Acceleration of Solutions: 466 participants reported 346 documented instances where information received prevented duplication of research. 466 participants reported 1111 documented instances where advanced information received influenced their research decisions.

Saving of Time: In 421 documented instances, the use of *IEG Memoranda* saved a total 1969 months, or 163 man-years of research time.

Saving of Money: A total of 159 instances showed an estimated $522,620 savings.

MEMBERSHIP. Was open to active researchers on a world-wide basis. There was a six-fold increase in the membership at the project's termination. For example, Group No. 1 numbered 725 members of which 329 were residents outside the U.S., with 32 countries represented. Average doubling time for membership was 10.5 months; minimum was 8.8 in one group; maximum 19.6 in another.

COST. Projected cost for 1966 to serve 3600 participants was $416,000 or roughly $115 per year per man served. If all 18,000 NIH grantees were included in appropriate similar groups, the cost has been estimated at $5 million annually.

COMMENTS. As already indicated, the experiment was conceived to facilitate communication among scientists and to ascertain how the invisible colleges function and relate to such a system. Through its five years of existence, the idea was proven workable. The basic problem of what constitutes a publication and what is the relationship between informal communications and the formal open literature have been brought to the fore.

Below is a brief outline of some of the parameters of the problem.

1. Quality: Does the elimination of the referee system increase the circulation of trash? Because 87% of the material in IEG was eventually published in archival journals, proponents of the system claim the contrary.

2. Increase in the amount of available literature: Because 87% of the circulated material was eventually published, opponents claim that the system feeds the information explosion by doubling the amount of paper to be inspected.

3. Time: Proponents claim that participants in the IEG system received what was to be published 6 months earlier than through existing channels. Normal time lag in biology

between receipt and publication of a manuscript ranges from 3 months to 2 years. Also, through the system the participant saw 80% of the major papers in his field (Group No. 1) in one source.

4. Citation: Although it was agreed upon by all participants in the experiment that all memoranda would be referred to in the formal literature as "personal communication," after termination of the experiment the Commission of Biochemical Editors ruled that no citation would be permitted in their journals to *IEG Memoranda*. (They also outlawed manuscripts that have been already circulating as *IEG Memoranda*)

5. Priorities: Each member assumed the responsibility of providing due credit for information obtained via the IEG system on matters where priority might arise. One of the criticisms levelled at IEG alleged that undue emphasis was given to priority.

North American Rockwell Corporation,[4, 12] Aerospace and Systems Group, El Segundo, California. SDI Service. The SDI system is part of a group-wide Technical Information Processing System that treats SDI and retrospective search as one problem using a single input and the same basic program for both. Participants deal with one of the nine Technical Information Centers.

CURRENT STATUS. Operational. Frequency of service, monthly.

DATA INPUT. All report literature received at any of the Technical Information Centers except those cataloged by DDC or NASA, and the ratio is approximately four external reports to one internal report.

INDEXING. Internal thesaurus.

USER POPULATION. 15,500 scientists and engineers on a group-wide basis.

USER PROFILE. These are prepared by participant and information center staff members jointly. Participant describes his interests in his own words and provides a list of relevant terms. Profiler assigns weights to terms and hit level. In addition to descriptors the system accommodates such *limiting* parameters as source, author, publication year, input year, and contract number.

PROFILE/DOCUMENT MATCHING. Weighting technique.

USER NOTIFICATION AND RESPONSE FORM. It is a monthly two-part computer print-out form. The notice part includes bibliographic data, abstract and descriptors whereas the response card contains the choices for participants to indicate relevancy.

EQUIPMENT. IBM 360/30 and 50.

COST. The following formula was quoted in 1965:

$.000125 × number of accessions × number of profiles plus 10¢ per notice for SDI.

For example in a given month

232 profiles	3018 accessions		1500 notices
$.000125 × 232 × 3018 =		$87.53	for search
Sorting and printing		150.00	
Total		$237.53	

(This amounts to 2.8¢ per accession or 37¢ per profile plus 10¢ per notice.)

COMMENTS. None.

PANDEX,[19] New York, New York. SDI Service.

CURRENT STATUS. Operational. Frequency of service, weekly.

DATA INPUT. 2100 journals, 7000 books per year, technical reports and patents; in addition to bibliographic and indexing data, such items as book price and LC card number for books are also included.

INDEXING. A specially developed thesaurus is used. Articles are indexed using a modified KWOC approach; books are manually indexed.

USER POPULATION. Government, educational, and industrial institutions, and/or individuals by subscription.

USER PROFILES. Prepared either by customer or in cooperation with Pandex staff using their thesaurus.

PROFILE/DOCUMENT MATCHING. Weighting technique.

USER NOTIFICATION. 1. Weekly tape service—to be searched by customer on location.

Programs given to subscribers:

a. A basic multi-term single-printout program; may be used as retrospective or current search tool.

b. SDI program for in-house SDI service. Output may be on tab cards or 3 × 5 cards. Pre-addressed return card for document request is indexed.

2. Direct SDI service from Pandex tailored to individuals or groups using program b (see above).

EQUIPMENT. IBM 360/40. COBOL programming language.

COST. $6500 per year for tape service. Approximately $150 per year for individuals.

COMMENTS. Pandex' data base is an interdisciplinary author/subject index to the sciences. It is presently available in three media: microfiche, tape, and printed form. Providing SDI services represents a further extension of their scope.

Technical Information Dissemination Bureau,[20] State University of New York at Buffalo, Amherst, New York. Current Awareness Service. The Technical Information Dissemination Bureau of the State University of New York at Buffalo was established in October 1966 as an affiliate of the Graduate School of Information and Library Studies within the Faculty of Engineering and Applied Science. Its objectives include the following:

1. To operate as an information services organization for faculty and researchers of SUNY/B and for scientists and engineers in the area.

2. To perform research and development into more effective ways of storing, retrieving, and disseminating information.

3. To design library and information systems and to implement and operate such systems on a pilot project basis.

One of the newly available information services, called Current Awareness, belongs to the SDI family. The following are its typical characteristics.

CURRENT STATUS. Operational since July 1967. Frequency of service, biweekly.

DATA INPUT. Source Index Tapes (ISI); Pandex Tapes (tentative by Pandex); Clearinghouse Report Information (by TIDB); and 300 engineering journals (by TIDB). These data are used to cover the health, life, and physical sciences and engineering.

INDEXING. None; natural language is used.

USER POPULATION. 100 health science faculty, 30 engineering faculty, 10 TIDB staff members, and 60 scientists and engineers from industry (through the New York State Technical Services Program).

USER PROFILE. The following two methods are used:

1. Participant develops his profile, information specialist modifies it. Participant can indicate specific interests, specific disinterests, specific authors, and journals subscribed to.

2. Information specialist develops profile based on a written paragraph summarizing participant's interests.

PROFILE/DOCUMENT MATCHING. Boolean logic, term weights, and complete negation by negative terms. Also, search can be conducted on names of authors.

USER NOTIFICATION. The computer generates biweekly a two-part card for each hit. In addition to bibliographic information and personal identification, data includes threshold value, total significance value, matching terms and their weights, and identification of items origin— i.e., article, technical report, etc. System evaluation is accomplished through a regular objective sampling of a participant's notifications, as well as through a subjective periodic evaluation.

EQUIPMENT. IBM 360/40, 128K core, 3 disks, 4 tapes (soon will be 5 disks and 256K core).

COST. $225 per participant per year. In addition, for the first year's service there is a charge of $50 for each participant and $100 for the company's participation. Copies of requested items cost: $2 per article, $3 per government report. Although initial expenses are provided from federal and state funds, eventually, portions of the program are scheduled to become self-sustaining on user fees alone.

COMMENTS. None.

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